The Builder.

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Railway Development, English & Foreign.

We have arrived at a period of crisis in railway development. It is not that any new impulse has been given either to our mechanical skill or to our commercial prosperity. It is not such a start as was due to the first triumph of the genius of Stephenson, or to the first practical outcome of the business capacity of George Hudson. It is due to no single event of magnitude; although the successful accomplishment of some of the greatest feats of engineering have recently been commemorated. But the general result of the engineering of the last forty years, when undisturbed by the avidity of speculators, is such as to indicate further progress. From all parts of the world the same signs are manifested. The Alps no longer exist as a mountain barrier necessary to be crossed in the route from Paris to Brindisi. The Isthmus of Suez no longer forms a material bar, compelling our ships to double the Cape of Good Hope. The eastern and western shores of the great American Continent are linked together with an iron band. And projects for a direct line of communication from our old *tête de pont*, Calais, to the capitals of our Indian Empire, are assuming more than a visionary probability.

Connected with, or at all events most significantly contemporary with, these wide-spread fruits of the skill and patience of the civil engineer, is the march of a movement in our railway economics at home which has been long urged by one or two farseeing men. Two of our largest railway companies, one of them the father of all our iron lines (for it has absorbed its own parent, the Liverpool and Manchester), the annual income of which amounts to a seventh part of that of the State itself, have agreed to make common cause, and to share a common purse. The example set by the London and North Western and Lancashire and Yorkshire railways cannot fail to be widely followed. It has, of late, become pretty clear that the main enemies to railway dividends have been railway directors. The spirit of actual hostility, the desire to injure a rival undertaking, at whatever cost, has been, perhaps not extinguished, but rendered practically powerless, by the absolute necessity to stop reckless outlay, and to close capital account. This was the first victory gained by the shareholders over the boards of management. But with new lines abandoned, and parliamentary contests suspended from pure inanition, the individualising spirit still ruled the several Boards. The wholesome, practical, eminently paying idea of a great railway federation was scouted. It may be extremely unjust to attribute to railway directors, as a body, any but the best and purest motives. Still, human nature is human nature; and any steps that might tend to destroy the power, patronage, and position enjoyed by the chairmen and leading members of the various boards of directors could not fail to excite an instinctive repugnance on their part. Thus the period of actual waste, of flinging away money by handfuls in the construction of unnecessary lines, has been succeeded by a period of passive waste. Attention has been given, indeed, with more or less wisdom, to the development of the resources of individual lines. But the immense advantage to be obtained by a common adjustment of all the details of the traffic of the country, by a system of through tickets, by the abandonment of duplicate trains and of the general ignoring, by one line or set of lines, of the existence of their neighbours, has been hitherto obstinately neglected.

How great an immediate return to the shareholder is to be secured by a wise and practical federation it is not easy to tell. In the case of virtually rival lines, such as those which have so long wasted the great resources of the south-eastern district, the result would probably be the most immediate. Where there are two or three routes available between the same *termini*, the arrangement of the trains on the several lines so as to quarter the day is a duty of the most obvious nature. It is one that has been almost invariably neglected. Yet the saving in the unnecessary trainage miles run that could thus be effected, without any loss of total revenue, would form a very appreciable item in the half-yearly accounts. Thus far the mere common sense idea of self-protection at which our coach-owners, after a good bout at competition, usually arrived, might have been thought enough to render Bradshaw a volume of much greater unity of purpose than is actually the case. But then, it is true, the competition for the best time of the day,—for the nine o'clock morning train, for instance,—might require some mode of arbitration. Everything, therefore, points in the direction of what our French neighbours would call syndicating the earnings of the lines. A common purse, to the common advantage of all, will lead to unity or community of management. That, before very long, some organised federation of our immense traffic companies will be carried out there is every reason to believe.

While the actual saving thus to be effected is large, it is nothing as compared to the stimulus that will be given to our internal traffic by the removal of the present petty and unnecessary obstacles. The politico-economical theory of supply and demand may be said to be inverted in the history of our English railways. It has not so much been the case, that the need of men to travel has led other men to supply improved means for so doing, as that the supply of accommodation, far more extensive and available than its projectors originally contemplated, has developed an enormous capacity for internal circulation, both of passengers and of goods. Every railway journey taken by any individual may be thought to lead to other journeys by other individuals, and to a corresponding increase of activity in postal, telegraphic, and mercantile interchange. Whatever may be the limit to this self-augmenting activity, there are no signs that we have attained or even approached it. When we see what has been effected by every instance of well-planned junction, and judiciously extended accommodation, we cannot doubt, that if the union of design and aim, for which the physical means for the most part already exist, be adopted by our leading companies, a great and rapid increase in traffic of all kinds will be the immediate result.

This result will, in the first instance, benefit those who may be thought most entitled to the advantage,—the holders of the ordinary stock and original shares of the railway companies. For the improvement which has followed a few years of failure in the railway system has been such as to lead us to this point. Preferential charges are now, as a rule, fully discharged out of profits. Debentures, debenture stock, and preferential shares of all kinds are already satisfied. The surplus profit belongs to the original shares; and as the proportion of capital over which every rudiment of new profit has to be spread is so much less than the gross capital by aid of which the earnings are effected, the rise of dividend will be very appreciable. The last half-year has shown this to be the case. The summer dividend of 1872, if the one-purse system shall have been extensively adopted by that time, may recall the golden days of 1845.

Our internal communications, within the memory of not more than two generations, have experienced three great eras of improvement. We anticipate the arrival of a fourth. The first of these was the great change wrought in our highways by the adoption of the simple, common-sense plan which MacAdam first induced the Bristol Road Trust to introduce, although in the Plains of Apulia it had been in practice from the time of Trajan. As far as the employment of horse-power, for speed and for luxury of travelling (though not for the conveyance of heavy weight), could be available, the Shrewsbury and Devonport mails and fast coaches may be said to have attained the best conceivable results. We had then a lull in the improvement of traffic. For some years we were content to maintain a rate of excellence that was nowhere to be met with out of England. Then came the unexpected triumph of "Puffing Billy" and his friends. Not knowing what to do with the waste high-pressure steam, the engineer turned it up the chimney, and found that, in its hasty escape, it afforded him the means of flying a mile in a minute. Steam volunteered to do more, after its actual calculated task was done, than had been asked from it in the first instance. The power of producing motion by pressure had been matter of calculation, the power of generating heat by rapid blast was an unexpected godsend. This blast was the very life of the railway.

Intermediate, to some extent, between the latest improvement of the highways and the substitution of iron tracks for the main through roads of the country, was the introduction of water-carriage for heavy merchandise. We are not among those who consider that we have heard the last word as to canals. In the first place, long lines of this nature exist, well laid out in many cases, and have to be kept up, or to be destroyed at a considerable expense. Thus the actual cost of water carriage is the lowest required by any mode of transport. The point where the canal is at a disadvantage is speed. So long as we stick to the towing-path the rate of transit is necessarily slow. But an age which has seen the application of steam-power to an object so refractory as that of breaking up the earth over a large area,—a duty that might well have been thought beyond the function of machinery,—is not likely to fail in the endeavour satisfactorily to apply steam power to canal towage, when once it appears likely to pay. In fact, the plan of what was called, many years since, the "messenger propelling engine," seems likely to meet every requirement. In any case the improvements of the past twenty years have been such as to lead to the anticipation that the application of steam or other mechanically-produced power to machinery of all kinds is yet only in its infancy, and that what we can now do by mechanism is but a very small part of that which mechanism is destined to effect. At present, however, we can only speak of canal transport as among the abandoned improvements of the past,—one of the three great steps made by our engineers in the conduct of internal traffic,—viz., good roads and good coaches, good water-carriage, and main trunk railways.

The stimulus that will be given to the railway

system by linking the networks of the various great companies together in one organic whole must cause, not only the great increase of traffic due to this facilitation, but the prosecution of what may be called the Secondary Railway System. Isolated attempts at this development have been made for some years past, with more or less success. We have had reports of the cheap construction and economical working of light railways in India, Norway, and elsewhere, that are perfectly conclusive in the opinion of engineers. We are witnessing the attempt to introduce tramways into London, with, apparently satisfactory results in a commercial point of view, although the questions of the interference with ordinary road traffic and of the effect likely to be produced on the rental value of the principal thoroughfares cannot be regarded as decided. But what is desirable, and will, no doubt, follow, is, that the service of those parts of the country which are as yet only very partially benefited by the railway system shall be regarded as a serious national object. Call them light railways, tramways, or what we like, we must have the means of reducing the running friction which forms so large a portion of the expense of land carriage placed at the disposal of the country. The important point is, that the method of effecting this object should be so decided by the best professional experience, that, when the wind of public favour sets in that direction, we should not have a repetition of the madness of 1845,—every man's hand against his neighbour,—for the construction of his own speculative tramway. A well-constituted railway federation, giving the weight of its sanction to the most available lines of subsidiary railway, in the first instance, may save us from this disaster. At all events, it is not easy to see what other check will be available, as Parliamentary legislation hitherto has only intensified the evils of competition.

The question naturally arises, can the control of the internal traffic of the country, if centralised, be safely intrusted to any other hands than those of the State. Out of England, the answer would be simple. Roads and highways have always been regarded as the special charge of the administrative powers. Postal and military exigences alone require the unfettered action of the Executive; and for the Postmaster-General or the Minister of War to have to apply to the Railway Director-in-Chief for the means of sending despatches, or moving troops, could never for a moment be tolerated in a duly-organised State. But it would be unsafe to make any prophecies as to England, however probable it may appear that railways will be dealt with by-and-by as telegraphs are now being dealt with. A country that allowed a mighty Continental empire to remain for a series of years under the rule of a trading company may well allow any commercial interest to grow, bit by bit, to Imperial proportions. Again, much of the battle as to the conveyance of mails and troops has been already fought out in detail, and in the application to the Legislature for powers to render the proposed federation not only legal but binding, opportunities would be afforded for the protection of the public interest. With the impression, then, that the ultimate form to be assumed by our railway management will be that of a department of the Government, we think there is no such certainty in the matter as to allow of any very practical inferences being drawn on the subject.

There is, however, a point of view of no small importance which is not only national, but international. Our insular position prevents us from being bound in the chain of that common interest which unites, or ought to unite, the railways of the Continent. But our interest in the proper development and management of those railways is scarcely inferior to that of the States through which they pass. Considering our connexion with India, the state of the line over which the Indian mail is transmitted to Brindisi is hardly less a matter of English interest, than the condition of the Holyhead route itself. Now there has long been a determination evinced by the directors of the French railways to throw every possible obstacle in the way of a route which shortens our journey by sixty hours, but which avoids Marseilles. The opening of the Mont Cenis tunnel brings this matter to a crisis. The Italians have their thirty miles of railway up to the tunnel complete; the French ten miles are all in disorder. Only an omnibus train, stopping so often and so long as to weary the patience of Job himself (if the much-enduring patriarch had taken a ticket) is allowed to crawl towards the perforated barrier of the Alps. The tunnel is complete; but, if French policy can avail, it will be rendered no thoroughfare.

We require a body of men, or a duly authorised individual, to deal authoritatively with this, and with similar questions, on the part of the commercial interests of this country. If left to diplomacy to settle, the dispute will unavoidably drag on for years. It is not by way of flinging a stone at our noble and patriotic representative in France that we say so; but a minister has his hands very closely fettered when he is called upon to advocate any commercial interest, and especially when, as in the present case, peremptory settlement of the matter must be demanded, on pain of making immediate arrangements (which are perfectly feasible) to avoid France altogether for the route of the Indian mail. That despatch must and will take place from the proper point of the South-Eastern Continental system of railways, namely, from the old Roman port of Brindisi. Our shortest way to this point is through the Mont Cenis tunnel. But other routes are open to us, and the day of Marseilles, as the sailing port for India, is over. If the French will not see this,—which is not unlikely,—we do; and we require machinery to act nationally, in consequence. It is now possible to effect a great saving in the transit of the Indian mail, and it concerns us deeply that this should be at once carried out.

There is one question which we are much surprised to find still not only unanswered, but even unasked. It is a question not, perhaps, of any great commercial importance, but of deep interest to the scientific world, and to the profession of the civil engineer. How did the two lines of the Tunnel meet? We all know that the junction was happily effected, and that the line is now complete and in working order, through the bowels of the Alps. We offer our most sincere and hearty congratulations to our Italian *confrères*, the engineers Grattoni and Grandis; and only regret that Sommeiller died just too early to witness the triumph. But we must be excused for asking for details. What was the actual measurement,—decimals, inches, feet, or yards,—by which the two centre lines, started eight miles apart, were found to differ from absolute coincidence when they met? What was the divergence in azimuth, and what was the difference in level? The more or less can hardly affect the well-earned fame of the successful engineers. But the gratitude due to their skill and tact will be increased if they will furnish an accurate reply to a question which, though exclusively technical, has a deep and lively interest for the profession in this country, and will furnish a piece of valuable information in the history of the important public works of the present century.

THE SOCIAL SCIENCE CONGRESS, LEEDS.

The Congress has begun its work. The Right Hon. Sir John Pakington, as president of the Association, delivered the inaugural address, in the Theatre of the Mechanics' Institute, on Wednesday evening. We confine ourselves to that portion of it which relates to Technical Education:—

I must now, said the President, ask your permission to advert for a short time to a branch of this great subject which has hitherto received little—I may almost say no—attention from either Parliament or the public; which nearly affects the welfare and prosperity of our skilled artizans, who are conscious of their own disadvantages in this respect, and anxious for their correction; and which touches no less directly the manufacturing and commercial interests of the country. I allude to technical education.

We cannot wonder, when we remember through what a length of time the elementary education of the people has been left to chance and charity, and what was and is a national duty has been treated as an individual hobby, as part of the pastoral duties of benevolent ministers of religion, and supported in a great degree at their own expense, from their own narrow means. We cannot wonder, I say, when such has been the treatment of indispensable elementary education by this great and enlightened country, as we consider ourselves to be, that the scientific training of boys, to fit them for those occupations and trades by which they were to live and prosper and gain reputation for themselves and their country, has been almost wholly neglected. We must take care that we do not before long suffer very seriously for this neglect, and without stopping to consider where the blame should rest, let us rather look to the future, and remember that "it is never too late to mend."

There are consequences of this neglect easily to be seen, and which we cannot afford to disregard. "We must take blame to ourselves for having allowed many branches of trade, skill, and commerce, which yielded to England the greatest remuneration, brought to her commerce the greatest reputation, and afforded to her people the highest wages and best work, to pass away into the hands of better educated people, in foreign lands, guided by wiser heads." These last words are a quotation from Mr. Scott Russell's able work upon "Technical Education," a work which I wish was in the hands of all who feel interest in either the national manufactures or our national education.

In England, technical education may be said to be provided for some of the higher classes of professions in our universities, and in other bodies, such as medical and engineers' colleges; and something has been done in Royal Schools by the Government. I have myself taken a humble but zealous part in the establishment of the Royal School of Naval Architecture, which is flourishing and doing good service under most able management, at South Kensington. There is also the School of Mines in Jermyn-street. There is the College of Chemistry, the Agricultural College at Cirencester, and some others; but, in the sense in which I am now speaking, I agree with Mr. Scott Russell that, "as a rule, technical education does not exist." . . . .

The question of technical instruction of the people is one which cannot wait. This is not a time for the Minister of Education to be negotiating foreign treaties, or helping to steer difficult party Bills through the rocks and quicksands of the House of Commons. The enemy is at the gate, not in the shape of fleets or armies, but in the shape of a rivalry in manufactures and trade, in which, if we fail to maintain the position we have hitherto held, our national prosperity will be undermined, and England's wealth, and power, and greatness will be a story of the past. Let us, then, be wise ere it is too late. The train is behind time, and if the guard cannot recover his lost ground, there will be a collision, in comparison with which the late prostration of unhappy France will be as nothing. The depression of France will be ephemeral—the ruin of England would be enduring.

But, important as I consider this subject of technical education to be (and I earnestly hope that the views I have so strongly expressed will go forth as sanctioned and approved by this Association), we should bear in mind that there are other respects in which the skilled workmen of this country consider their position to be unsatisfactory, and especially when they compare their position with that of men of the same class in other parts of Europe. This is a delicate and difficult subject, especially at the present time, when we are daily disturbed by rumours of international organisations for political purposes, and when we know too well that there are not wanting men who devote themselves to attempting to inspire the minds of our working classes with feelings of discontent and disaffection, and so to make them instruments for the accomplishment of revolutionary objects.

I hope it will be the opinion of this Association that I am now touching on a subject immediately within our proper sphere of action; that it is a subject from the discussion of which honest politicians ought not to shrink; and that it is a subject with which our Government and Parliament ought promptly to grapple in a bold and conciliatory spirit. It is not easy to imagine any object more noble in itself, or more worthy of the highest ambition of a patriotic statesman, than to avert discontent and disloyalty amongst the industrious masses of our countrymen, by the timely concession of moderate and reasonable requirements. On the other hand, it is not easy to imagine any conduct more wicked, more to be condemned by every honest mind, than the attempt to sow discord and disunion between class and class, by exaggerated statements and mischievous representation, which can only end in bitter disappointment to the man and serious injury to the State. What, then, are the principal requirements now felt and urged by working men?

I have already referred to their great need of technical education, and this, if we value the prosperity of England, must be given, and on

fair terms; but the object which stands at the head of their requirements is—"To rescue the families of workmen from the dismal lanes, crowded alleys, and unwholesome dwellings of our towns, and plant them out in the clear." . . .

The state of village and town education in Switzerland is such, that the workmen's children receive an education that fits them for practical life; and those meant to be skilled workmen get drawing, geometry, physics, mechanics, taught at a cost nearly nominal, and which, in case of need, becomes gratuitous. This description applies equally, or almost equally, to the valley of the Rhine, and other parts of Germany. But such comparisons ought rather to stimulate our Government than to depress our people. Let the English workman bear in mind that as regards Germany and Switzerland, when compared with England, the social, political, and physical differences between the countries are such as to make fair comparison almost impossible. Let him bear in mind the points, and they are not a few, in which his position is as superior to that of the Swiss as in others the Swiss is superior to him. Let him reflect on the advantage which, beyond almost every people in Europe, he possesses, in the vigour, the energy, and the aptitude of his national character; and above all let him remember that it is in the power of the Government and Parliament of his country to remove, or at least to modify, those disadvantages by which he feels himself overweighted in the great race of competition.

In Mr. Samuelson's report to the Government on the rapid progress of the manufacturing establishments of France, Switzerland, Germany, and Belgium, he says, "Meanwhile, we know that our manufacturing artizans are imperfectly taught, and our agricultural labourers illiterate; neither one nor the other can put forth with effect the splendid qualities with which Providence has endowed our people." This is confirmation, and from a very competent quarter, of Mr. Mundella's opinion that, with proper culture, "England would possess the most intelligent and inventive artizans in the world."

What, then, is to be done? I submit that the people,—for this is not a question interesting to the working man alone,—have a right to appeal to the Government for active aid in this pressing matter. I agree with a distinguished friend of mine, who was one of my predecessors in this chair, that we should "impress earnestly upon our countrymen the incalculable value of self-reliance and self-help," and that in the domestic affairs of the country, we should seek the aid of Government only in the last resort; but the reforms for which our working classes ask, are on too large a scale to be entrusted solely to the self-reliance and self-help of the people themselves. The establishment of a system of technical training could not possibly be accomplished by the people. With all the aid that he might derive from the precedents of Holland, Berlin, Stuttgardt, Austria, Hanover, Carlsruhe, and Zurich, the task is one which would now, in England, require all the energy and power of an able minister, supported by a consenting Parliament.

At the conclusion of the address, which occupied an hour and twenty minutes in delivery, a vote of thanks was passed to Sir John Pokington, on the motion of the Mayor, seconded by the Dean of Durham.

CONDITION OF LEICESTER.

THE PHOSPHATE SEWAGE PROCESS.

It is now something like two-and-twenty years since Thomas Wicksteed first introduced, at Leicester, his well-known process for the treatment of sewage, which is a slight modification of the late Dr. Clark's ingenious mode of softening water by means of hydrate of lime.

During all these years the scheme has held its sway on and off, omitting intervals of experimental trials by other modes of treatment, such as the ferric chloride, various descriptions of lime (those now in use are the Crich and Butterley mountain limes), mixed with other ingredients; the much talked about A B C method of Messrs. Siller & Wynar (alum, blood, and clay), together with others.

Notwithstanding these fears of experiment and re-experiment, the river Soar remains in a shockingly filthy state—the water of a muddy consistency and bluish black colour, here and there tinged grey from precipitating lime, and smelling very badly. The surface is covered in places with a frothy, milky scum, whilst at intervals huge bubbles of gas ascend to the face of the water, and burst, filling the air with a noisome, foul odour, painfully discernible at considerable distances from the river margin, and the effluvium is augmented by innumerable little gaseous bubblets, always on the rise, giving to the surface of the water the appearance presented by falling rain-drops.

This fact points to the extreme putridity of the sedimentary river bottom, now rapidly silting up below the sewage outfall, notwithstanding repeated attempts at dredging. But none of the schemes yearly tried bring relief, even aided by an actual cash outlay of 1,500*l.* per annum paid from the rates, and the nuisance continues and increases until at last the outraged residents upon the river banks, after long threatening action for pollution of the running stream, are at last about appealing to the Court of Chancery for redress; and there can be no question, judging on the spot and viewing the river's condition, it will be speedily granted.

At this pass the Phosphate Sewage Company step in with Forbes's aluminic phosphate process of deodorisation with precipitation, and this has been adopted during the past six or eight weeks. The company is in negotiation with the Town Council for a continuance of their process.

It is many years since it was set forth that the town of Leicester required the following objects in carrying out a system of sewerage and precipitating works, which the lime process was to fulfil. We cannot do better than repeat them in the present day:—

"1. The division of all sewage, dye, and scouring waters, from the river Soar and Leicester canal, and their removal as speedily as possible from *under and near* the town of Leicester, so as to relieve the town from all noxious exhalations and to restore the river to the salubrious state in which it was before it was made the common sewer of the town.

2. The removal of this sewage to such a point in the river *below* that the process of collecting and disinfecting may be carried on without injury or annoyance either to the inhabitants of the town itself, or to those of the adjacent villages; and that the process to be adopted in its disinfection be such that the water before it is returned into the river Soar (below the town), shall be in a state of at least as great purity as it was in the river above the town before any sewage or dye waters had contaminated it.

3. That the fall in each sewer shall be sufficiently great to produce a velocity that will not only carry off rapidly the liquid filth poured into it (so as not to allow of stagnation or of time for decomposition), but also to produce a sufficient scouring power to prevent the accumulation of *débris* or heavy deposits of road drift."

Exceedingly laudable and proper objects of attainment, no doubt. Let us see how far the promises have been realised.

1st. This has been to some extent carried out. The sewage is certainly diverted from the river *near* the town and removed to a point distant a mile or so from it, entering the river in much about the same condition as it leaves the sewers. Sewage, however, yet remains *under* the town, cloying the ground and polluting the wells.

2nd. As stated above, the bulk of the sewage is removed to a point in the river below the town sufficiently remote not to be a nuisance to its inhabitants; but there is little or no disinfection, although there is great injury and annoyance to the inhabitants of adjacent villages. Moreover, no process of disinfection hitherto has been adopted such that the water before returning to the river is in a state of at least as great purity as it was in the river above the town; on the contrary, the whole river below the outfall is of the appearance of a huge open sewer, of the filthiest description, and for miles along its course not a trace of Letheby's aquatic plants remains, although above the sewage works aqueous vegetation is abundant and healthy, for there the water is pellucid and crystalline.

3rd. The fall in each sewer is not sufficiently great to carry off rapidly the liquid filth poured into it; but the dead level of some, the actual reverse fall of others, with the imperfect workmanship of the majority, do allow of and produce much stagnation, with attendant decomposition of solid sewage. Positively completely-choked sewers may be counted by the dozen; whilst there is no adequate provision for the ventilation and riddance of the generated gases within them, for many districts are entirely without a single ventilator. Such are marked, and may be known by the prevalence of typhoid and other fevers; and these evils, coupled with a sewage-tainted water-supply, account for heavy annual epidemical losses by fevers and diarrhœa, from which latter disease Leicester suffers more than any town in Great Britain,—indeed, if not even in Europe and in India.

Writing of the condition of the sewers, we have one in memory at the moment which begins at one end of a certain street actually terminating at the other end in a large cesspit sunk into porous gravel, whereby the well-waters are heavily polluted; and owing to no proper exit for the sewage, the house-drains rapidly clog with solid matter from the closets; so that hereabouts sickness is the rule and health the exception. The street has been in this condition for some years, and the evils are aggravated by the facts being well known to the *Health* authorities.

Therefore we see that the promises of twenty-two years ago of sanitary reform have not been fulfilled. Such gross neglect and utter apathy surely call for rebuke from the central authority.

Leicester presents the anomaly of holding up her head, and crying, "I am the cleanest of the clean; my sewers are ample and efficient; their ventilation is perfect; and my water supply is good and wholesome;" yet having the highest death-rate of any town in the kingdom,—a mortality from one disease alone higher than that of Bombay from every cause whatsoever!

A town that is *perfect* must needs find some excuse for its notoriety, and we are told that the high death-rate is due to "simple heat!!!" We give the full amount of admiration.

Perhaps in the next instance we shall be told that the temperature at Leicester, like its mortality, exceeds that of Bombay and Calcutta!

To return to the phosphate process of treatment. Several visits made to the sewage works during the experiments showed there was certainly an improvement, inasmuch as there was little of that noxious smell about the works characteristic of the lime process. The *modus operandi* consists, in the first place, of treating the powdered native aluminic phosphate obtained from the company's deposits in the island of Alto Vela, in the republic of San Domingo, with crude undiluted sulphuric acid.

On solution, and after thorough agitation, performed by the aid of a portable engine, close at hand, the solution is run into the main trunk-sewer of the town, immediately above the works, and in the proportion of 1 of phosphate to 2,500 of sewage. The mixed sewage and phosphate is now pumped into the large depositing tanks attached to the works, but, before entering them, is further treated with cream of lime, in the ratio of 1 to 5,000, and the whole mass thoroughly agitated with appropriate machinery, driven by steam power. The hydrated aluminic phosphate is set free by the addition of the calcic hydrate, and precipitated in gelatinous flakes, presenting an immense surface, so that the sedimentary matters of the sewage are held in a net, as it were, and carried to the bottom of the tanks by the superior gravity of the alumina compound.

The chief features of this process are the manufacture of phosphated manure of any strength, suited to the requirements of purchasers; the combination with irrigation, after classification of the sewage,—for the scheme admits of either the precipitation of the whole of the phosphated manure, or merely of the sedimentary matters contained in the sewage, together with a small portion of the added phosphate only, the deodorised fluid retaining the valuable ingredients,—such as the phosphate and the ammonia,—and in a form readily available for irrigation. Moreover, the effluent water is clear and colourless, thus removing the main objections against irrigation, *per se*. This elasticity of the phosphate mode is of considerable practical value, because two distinct methods are available, at the discretion of the operators, or the exigences of the particular period of the year, and can be worked alternately.

As regards the value of the new process as a defecating agent, Dr. Voelcker, who has watched it at Tottenham, says, "Any person who has once seen the extremely rapid and simple process by which foul raw sewage is defecated and clarified by this plan cannot but be struck with the rapidity and efficient manner in which raw sewage is rendered almost as clear and inodorous as ordinary water. I therefore have no hesitation in saying that effluent sewage as thoroughly purified as I saw it done at the time of my visit may be safely discharged into a water-course without fear of causing a nuisance." The value of the precipitated manure Professor Voelcker estimates at from 2*l.* 10*s.* to 7*l.* 7*s.* a ton, depending upon the quantity of phosphate employed as a precipitating agent.

At the Leicester works we saw two tanks in operation; through one defecated sewage flowed at a rate, as stated, of 3,000 gallons per minute.

This water was deodorised, but far from clarified, because, as the agent stated, the flow was much too rapid and the tanks were too small to admit of proper precipitation; but we take leave to mention another more potent cause.

One defect requiring mechanical remedy is this. When the flocculent hydrated aluminic phosphate forms, the sediment settles with it in the tanks, and the sewage is both deodorised and clarified. But as this highly-organic precipitate is allowed to accumulate at the base of the tanks for weeks and months, secondary decomposition sets in. The generated gases rising to the surface counteract the good effects of the superior gravity of the precipitant, resulting in the supernatent water becoming charged with foul matter that passes off with the effluent water, contaminating it with what is in point of fact anterior sewage. We know this on reasoning by analogy, and proof lies in the large patches of black organic matter always on the ascendant within the tanks, and passing the overflow to the river.

OPENING OF THE ROCHDALE TOWN-HALL.

The town-hall of Rochdale, the foundation-stone of which was laid by Mr. John Bright in March, 1866, has been formally opened with a grand banquet in the hall of the new building. The occasion was observed as a general holiday.

We gave a view and plan, with particulars of the edifice, in our volume for 1866 (p. 869), but we may here state that the style is Decorated Gothic of the fourteenth century. The building is 230 ft. long by 90 ft. at its greatest width. There are three floors at each end, the large hall occupying the entire centre position. At the north-east angle there rises a tower 140 ft. in height, surmounted by a spire, which brings up the entire height of the tower to 240 ft., and the spire terminates with a finial representing St. George and the Dragon. Over the entrance to the tower are thirteen empty niches, which it is intended to fill with statues. The spire is profusely gilded. The exchange has an extreme length of 72 ft. by 39 ft. wide, and the walls and roof are decorated. The grand staircase leads directly to the large hall, which is profusely embellished. Its extreme length, exclusive of the orchestra, is 30 yards by 20 yards wide, and 68 ft. in height from floor to apex. It is calculated to accommodate 1,200 persons, and will be used for public meetings, concerts, &c. The council-room extends the whole width of the building, and is 60 ft. long by 24 ft. wide. The decorations in this room are elaborate. The borough court-room is 51 ft. by 34 ft.

The entire cost of the town-hall, which is situated in the centre of the town, will be 100,000*l*. That sum includes the purchase-money of twenty acres of ground, which adjoin the hall, and which have been laid out as a public recreation ground. The architect is Mr. W. H. Crossland, of London; and the contractors, Messrs. Warburton, Brothers, of Manchester.

The contractors, on the opening, gave a supper to their workmen, and other contractors for works connected with the Town-hall: about 150 persons were present.

DIRECT TRACTION PLOUGHING.

The question of steam cultivation is certainly uppermost in the agricultural world at present, and the ponderous and primitive apparatus still in use is likely to be superseded by more simple and sightly implements. At all events, promising efforts are already being made to that effect.

As a step in this direction, Messrs. Robey & Co., of Lincoln, have been carrying out a series of experiments, and perfecting an apparatus which appears to promise the desideratum so much hoped for.

The principle aimed at is to adapt the Thomson's road-steamer with indiarubber tires, to ploughing by direct traction. In a trial at Lincoln, the little traction-engine has responded cheerfully and successfully, it is said, to this new demand made upon it.

The steamer was nominally of 8-horse power, with double cylinders; its total length was 13 ft., and its extreme width 6½ ft.; its weight, ready for work, 6 tons; its capacities of speed from 2½ to 6 miles per hour; and with a guaranteed capability of traction-power to haul on an average road 12 tons up an incline of 1 in 12, or 18 tons up inclines not exceeding 1 in 30. The plough was manufactured by Robey & Co., and specially designed for adoption with the road-steamer. Bearing in mind the fearful and cumbrous balance-ploughs of ordinary steam cultivation, this contrasts favourably by its compactness and simplicity. It is in appearance something like an enlarged Pirie's double furrow plough, as made by Fowler & Co., of Leeds. It is capable of ploughing four furrows 9 in. wide and from 6 in. to 8 in. deep, or three furrows 12 in. wide by the same depth. Its most noticeable feature is a patented arrangement for turning, at the headlands. So soon as the road-steamer reaches the headland and begins to turn, the plough is gradually raised out of the ground, and the ploughman has only to secure a lever in its catch; on reaching the next land the ploughman disengages the lever, and the plough at once commences the new furrows. The steering of the plough is very simple, and it is mounted on four wheels for travelling on the roads.

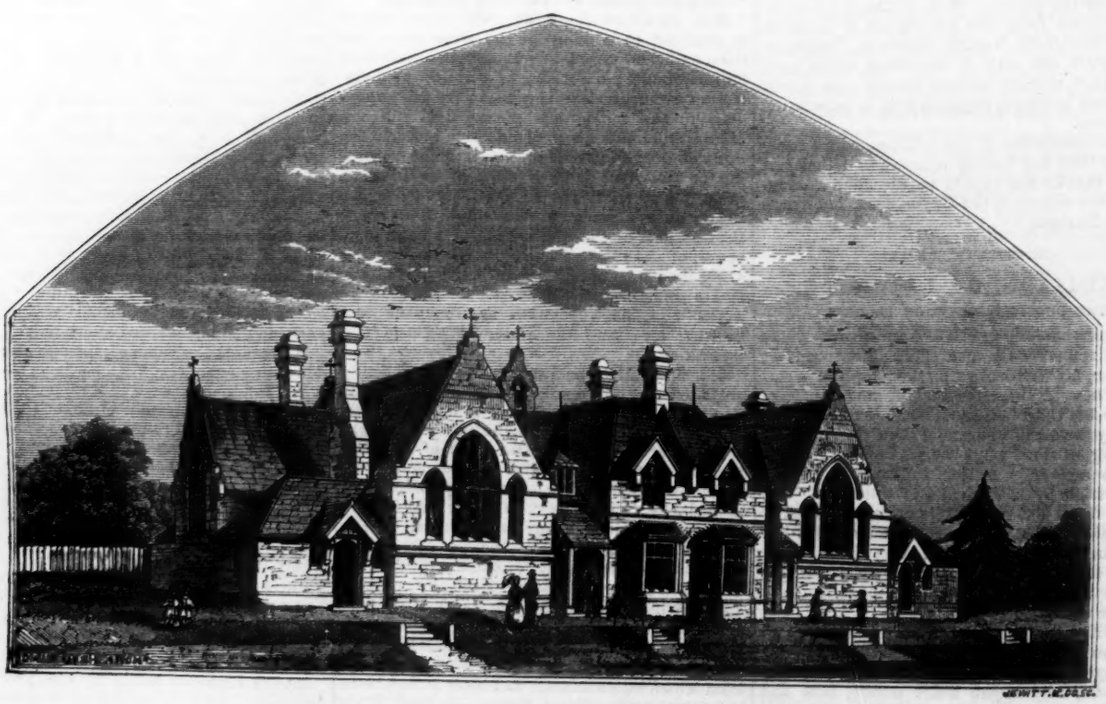
It is urged in favour of this mode of steam ploughing, that there is "simplicity with direct traction, no power lost, comparatively nothing to get out of order, wear and tear reduced to a minimum, and three men manage the whole apparatus." The work, it is said, was beautifully done; and as to results, the speed in ploughing was about three miles an hour, and the ground turned over by the plough one yard wide. It will plough a few perches short of nine acres per day. The net cost is about half the price of similar ploughing by horses. The road-steamer can be applied to nearly all farming work,—thrashing, grinding, and hauling produce, as well as cultivating the land.

ST. MICHAEL'S SCHOOLS, SYDENHAM.

On the 28th of September was laid, by Mr. Charles Henry Mills, M.P. for West Kent, a chief stone of new schools for St. Michael's district, Sydenham. A service was held in the church close by, the Dean of Rochester preaching an eloquent and faithful sermon upon the education of the young, after which the clergy and congregation proceeded to the school site, where prayers were offered by the vicar, the Hon. and Rev. Augustus Legge; and then Mr. Mills performed the mason's office, concluding with an appropriate speech upon the effort that is being made for education. The buildings are to provide for 330 scholars, boys, girls, and infants, in three distinct schools, with their requisite class-rooms and offices, and there are to be two houses for the teachers, the whole being in a simple style with high roofs, and the effect produced by grouping, as designed by the architect, Mr. Edwin Nash, of London. The expenditure will be about 3,500*l*., raised chiefly by local subscription, but aided by liberal grants from the Privy Council and from the Diocesan and National Societies.

The contractor for executing the work is Mr. James Hollidge, of South Norwood.

A view of the schools accompanies this notice.



ST. MICHAEL'S SCHOOLS, SYDENHAM.

EXETER SEWAGE UTILISATION WORKS.

A company, with a capital of 40,000*l.*, having for its object the interception and utilisation of the city sewage, has been for some time past in process of formation in Exeter. Within the last few weeks a lease, which concedes the sewage of the city to the company for a term of twenty-five years, has been signed and sealed by the Town Council and the Company, under which the company undertakes to construct between three and four miles of intercepting and outfall sewer, pumping station, and all other necessary works, according to plans and specifications prepared by Mr. Charles E. Ware, C.E., city surveyor, who in May, 1870, presented a comprehensive report on this subject to the Town Council, on which the present works are based. The sewage is then to be pumped and applied by irrigation to land, none of which is to be within two miles of the Guildhall (centre of the city), and in connexion with this irrigation the company proposes to pass the sewage through filters, so as to remove the grosser portion for conversion into portable manure. For this purpose, an extensive pumping-station and manufacturing-house have been designed, provided with duplicate engines and filters, so as to insure, in combination with the irrigation, which forms the chief feature of the scheme, the perfect purification of the sewage under all conditions, even in the event of accidents to engine and cleansing of filter. An extra purifying conduit for storm or excess sewage is also provided. Mr. Hope, whose farm at Romford is so well known, will give the Company the benefit of his special experience in cropping, &c.

The whole of the constructive works have been let to a London contractor, who has already commenced their execution, under the supervision of the city surveyor.

WINDOWS.

"Since light so necessary is to life"

(to adopt the reflection of Milton's "Samson"), it is a natural consequence that, next to the provision in a building of the means of ingress and egress, the admission of light to the interior should have been one of the earliest and most important desiderata which architecture was required to take into account. We name advisedly "the admission of light" as the first office of the window; for that of providing outlook, or prospect is, so far as we may judge from the architectural remains existing on the earth, in the main a requirement of a later civilisation than that to which we owe the greatest architectural monuments of antiquity. Had we more data as to the domestic architecture of the Egyptians and Greeks, we might possibly find reason to modify this conclusion. But, so far as their sole existing witnesses, their temples, bear evidence, the window appears solely as the means for the admission of as much light as was considered necessary; and not only is the provision for view from the interior completely ignored, but the window itself, as an external feature, is practically non-existent. This fact, contrasted with the important part played by the window in modern, and especially domestic, architecture, is not insignificant. We perceive, on a due consideration of the subject, that in proportion to the importance and grandeur of the internal architecture of an edifice do windows for outlook from it become unnecessary and impertinent. In such cases, the building itself is supposed to be sufficient, in itself, for our interest and admiration, when we are once fairly inside it; to provide means for carrying the vision thence to the outer landscape would be to weaken the effect of the internal architecture by distracting our attention, perhaps also to destroy or impair its scale by comparison with outer and more familiar objects. And when the building has been erected for the celebration of any mysterious and solemn worship, then is this seclusion from the outer world the more sought and insisted upon, and even the necessary light is admitted reluctantly and by stealth, lest it dissipate the repose and mystery of the interior, and awaken hints of the lights and shadows of the outer world. In such an edifice we are to be content with the building itself as our world for the time being; to have no thoughts, no longings beyond its over-vaulted gloom: we are closed in an inner world where the outer one is forgotten and ignored. Of what may be called the "sublime of lighting" with this object, probably no building ever furnished a grander example than must have been presented by the interior of the Temple of Karnac, with its slanting rays admitted through the low apertures over the larger central columns, half showing and half concealing and exaggerating the extent of the forest of columns on either hand of the central avenue. According to recent theories and investigations, the lighting of the Parthenon and other Grecian temples must have been on a somewhat similar plan, though, we can hardly doubt, with a larger proportion of light and less of gloomy and mystical effect, which indeed could scarcely have been aimed at or obtained in buildings of such comparatively small dimensions. Then we have another type in the Pantheon, symbolical, with its full flood of light descending from the centre of the dome, of the cheerful, practical Roman mind, which was very little concerned with mystery of any kind. But all these typical modes of lighting, thus illustrated in the temples of bygone rituals, have this in common, that their window-space, whether abundant or the reverse, is solely for access of light, taking no account of the window itself as an element of external design, still less as a means of prospect from within.

In short, it may be said, that the window, properly so called, is one of the principal means of embodying what has been termed "courtesy," or "politeness," in architectural expression; that it is in proportion as society emerges from the dominion of the supernatural, becomes less ecclesiastical (using the term in a comprehensive sense), and more civil and social in its view of life, that the window comes into use as an external feature, and a means of architectural expression, instead of being a mere aperture to let in light in a more or less effective manner. And, going a step further, in proportion as we go from civic and political to domestic life, in that proportion does the window assume importance in its third aspect, as a means of looking out from the interior, as well as giving expression to the exterior. The gradation is a natural and obvious one. In our churches we want no outlook, and we still seek for a certain dim effect through the medium of coloured glazing, while the windows are certainly designed on the whole more for interior than exterior effect. In our council chambers, our halls for public business or festivities, we desiderate large windows, and an ample supply of light, but outlook is a very secondary consideration in such cases: what is going on within the building monopolises attention for the time. But in our dwelling-houses, where our daily life is passed, and in all rooms the uses of which partake of a domestic or home character, we no longer wish to concentrate our attention within doors; rather we would diversify and render more cheerful our existence by looking on our neighbours, on the flowers, the fields, and the clouds; we have no such weighty business that we need close our eyes and mind to the outer world, and our window is transformed from a mere means for the admission of light, into a look-out post, a place of contemplation, a means for connecting our life and interests with the world without.

And so, just as "light so necessary is to life" indoors, we find conversely how necessary are lights or windows to the life and expression of the building outside. We have recognised this, and have borrowed from the Latin a long word, "fenestration," what the Germans would call "window-work" (*fenster-werk*), to express the part played by the windows in the external design. The word seems, however, to be used somewhat indiscriminately, to express either the manner of disposing and arranging the windows in the external design, or their decorative treatment. But wherever the latter meaning is predominant,—where the attention is directed to the decorative adjuncts of the windows rather than to their grouping and arrangement,—we may suspect the presence of a certain degree of sham design in the architecture, and that the power of what may be truly called *artistic building* has not been present. A great deal may be done to make what is called a "handsome" building by decking the windows with pediments, and pilasters, and consoles, and such other orthodox decorations; but it is in grouping, proportion, situation, that the real effect of window treatment resides, in aiding and emphasising expression. In the case of a large palatial apartment, for instance, intended specially for festive or State ceremonials, a dignified and suitable expression is best given by completely symmetrical fenestration. In some cases, especially where the range of windows is long, and affords room for a good perspective effect, the end may be attained by the very simple arrangement of a row of similar windows equidistant and precisely repeating each other. This, however, especially when the edifice is not large enough for real grandeur, is apt to be very monotonous; and it is better in many such cases to combine symmetry with variety by the repetition of groups of windows, or the alternation of two groups slightly varied in disposition.

Where windows are required to be symmetrically placed, but at intervals, an effect at once rich and piquant may be obtained by repeating in the intermediate piers the design of the window, or part of it, as a wall-arcade or panelling. In windows with mullions and transoms, for instance, the repetition in this way of one of the small sections of the window in a series of blank panels continuing the line of the lights, may be made with admirable effect. Both these methods of treatment combined may be seen in the simple and beautiful external clearstory of Lincoln Cathedral, where, in the nave, the lancet windows are arranged in groups of three, the middle one slightly wider than the two others, and each group is separated by three narrow blank arches of the same design ranging with them. In the choir the windows are also in threes, but the two side-lights much narrower than the centre—mere slits almost; the groups divided in this case by *two* wall-arches the same width as the centre window. There can scarcely be a more pleasing example of combined simplicity and picturesque character. But such symmetrical dispositions, however varied in grouping, are suitable rather to large apartments or very symmetrically planned buildings than to houses divided into numerous unequal-sized compartments, as most English houses are. In this latter case, an attempt at complete symmetry and regularity in the windows is a falsity, and deprives a dwelling-house of its most characteristic expression. Not, however, would we advocate a studied irregularity, or altogether ignore a conventional symmetry in the external design, even where this does not exist inside. A certain degree of symmetrical spacing is especially suitable in that aspect of the house which is most exposed to public view and comment; for, as it has been observed elsewhere, a certain effort at external symmetry in such a case constitutes a part of the "courtesy" of domestic architecture, a kind of testimony to the spectators that they, who only see the outside of the house, are not forgotten, and that provision is made to satisfy their eyes by an external *rhythm*, even at the cost of a little trouble and contrivance. Those aspects of the house which are mostly seen by the inhabitants and their guests only, may suitably and picturesquely assume a greater licence of irregularity, conforming easily to the internal plan, and thus presenting on their "family" side a more homely and domestic expression, and a pleasant and characteristic contrast to that of the front. Browning has happily indicated this kind of contrast between the outer and the domestic aspect of a dwelling, in his poem entitled, "In a Gondola:"—

> "Row home? Must we row home? Full surely
> Know I where its front's demurely
> Over the Gindecca piled;
> Window just with window mating,
> Door on door exactly waiting,
> All's the staid face of a child;
> But behind it, where's a trace
> Of the staidness and reserve
> And formal lines without a curve,
> In the same child's playing face?
> No two windows look one way
> O'er the small sea-water thread
> Below them."

Such irregularity, however, is only interesting, only truly picturesque, when it is evidently the natural result of the interior disposition of the building; nothing is more impertinent than a studied and intentional jumble of windows of various shapes and sizes, without any regard to meaning or utility. It is this kind of trick in design (for it is nothing more) which has drawn down on the talented author of the proposed Law Courts design a good deal of criticism; and it is well for young architects, who are tempted to distinguish themselves by an affected eccentricity, to bear in mind that this kind of falsity of design is more quickly seen through by the non-professional public than almost any other. But within proper limits, the whole arrangement of a plan may be made the basis for appropriate variations in the fenestration; a long passage suggesting a row of small lights,—a staircase, a large and lofty window; and so on in almost endless ways which will present themselves to a designer with an eye for the picturesque of architectural expression.

Indeed, it is when we come to domestic architecture that we find most scope for a varied and original treatment of the window; regarding it in this case as an internal as much as an external feature. As the central source of the light in a room, as well as the medium through which the outer landscape is viewed, the treatment of the window affects the character and general look of the room more than anything else. And here we must enter a protest against the formal, bare, prosaic treatment which this important feature so often receives in modern dwellings. The spirit of show and ostentation which gave rise to the preposterous plate-glass fronts of our shops, has infected even the dwellings of the country gentlemen. Huge, tall plate-glass sashes, bare and inexpressive, letting in an unnecessary glare of light, are now the rage; and convey an appearance of vulgarity even to what is otherwise a quiet and unpretentious dwelling. Plate-glass is a useful and fine material in its way, and has besides the practical advantage of superseding in a great measure the necessity for shutters, so far as security is concerned; but there is no reason why it should be used in as large squares as can possibly be made, and the windows made twice as large as necessary, in order to display the regulation expanse of glass. These large windows both destroy the architectural appearance of a house from the outside, cutting up the walls into great square holes, and destroy the repose and homeliness of the rooms inside. How far more picturesque, how much more pleasant to look through, how much more constructively satisfactory, are some long low mullioned windows to be met with in old-fashioned houses, through which the sunlight falls upon the walls in a pleasant lattice-work of light and shade, and further tempered perhaps by a fringe of ivy or jasmine overhanging the glass, instead of being poured into the room in one blinding flood. Because there is a beautiful view outside, we do not need to cheat our eyes into the belief that there is nothing interposed between them and it, or to provide for exhibiting it to a crowd of spectators. On the contrary, we venture to say that no landscape looks pleasanter, if it be pleasant at all, than when viewed through the mullions or shafts of a divided window; these architectural features close to the eye give additional value to the distance, conveying to the inmate, too, a certain feeling of repose and security, of being shut up and protected from the intrusion of the outer world: all which picturesqueness and pleasant association are demolished by the over-large modern plate-glass window. Where a certain degree of window-space is necessary, it can mostly be much more pleasantly and effectively provided, both in regard to external and internal design, by two or three moderate-sized windows than by one large gaping aperture. Windows down to the floors are very common in "entertaining rooms" now, but this is generally throwing away light where it is not wanted; and bringing the light more to the bottom than the top of an apartment is just the reverse of the natural and picturesque way of introducing it. For sitting-rooms the moderately low window, with that good old institution the "window-seat," is the best arrangement, the window-seat being the pleasantest possible place for an idle read or chat, looking out on a summer landscape, and giving in winter and on dull days an opportunity of taking the book or the work-basket "to the light" in the readiest and most convenient manner. Bay-windows form a very useful feature in the external design; in small houses often furnishing almost the only opportunity for a little bit of picturesque breaking up of the plan. They may be treated structurally either as an integral part of the building, and carried out entirely in brick or stone; or as a mere projected window-frame of carpentry. The nature of the site and the character aimed at in the house will decide this. For interior effect, a bay can hardly be ill-placed, and nearly always improves a room. In a dining-room it is best square on plan, and at the end of the room, furnishing opportunity thus for a practical lengthening of the room when a very long "table" is to be provided for. In a drawing-room, a semicircular or semi-octagon plan is more suitable for it, as a piece of family and friendly conferences and conclaves on a small scale. In either case the ceiling of the bay should be separate from and lower than the main ceiling of the room, so that it appears as a window and not as part of the room. The octagon plan is best with the front or outer side nearly double the width of the oblique sides, the latter being at an angle of 45°;—a form of bay not unfrequent in some old-fashioned houses, where the outer side is the same width, or even narrower, than the oblique sides, and the latter forming a much more acute angle, is very awkward-looking, and by no means to be imitated. In street houses, side-lights in bays are altogether a mistake, destroying privacy. In some of the small houses in the suburban streets of our towns the bay windows may be seen through to an indefinite extent each way by an inmate standing in one of them. Small bays at angles, on the upper floors especially, are very suitable appendages to town houses so situated as to admit of them, giving a view in two or three directions, and breaking up the angle of the street into a picturesque outline when seen from the exterior,—that is to say, they will do all this if Building Acts will permit them; but towns which are blessed with that legal weapon for squeezing all life and expression out of their street architecture (though necessary in other respects) will probably find themselves debarred from this source of effect.

The method of hanging the windows has no little influence on their general effect as well as their construction. The old casement window opening on hinges had been up to a recent period completely abandoned in favour of the sliding sash and weights. As a matter of fact, we believe that practical advantages as well as appearance are mainly on the side of the casement. The sight of a whole cartload of "weights" discharging, for the windows of a large dwelling-house, certainly does not suggest the idea of economy of construction, especially when we take into account the time lost in weighing and fitting the sashes, the certainty of periodical breakage of sash-cords,* &c. But in addition to this, the sash-window involves "boxings, casings," and all that flimsy cradle-work in which the modern joiner specially delights; whereas a casement can be hung in a solid frame, without any patching-up of glue or nails, and is, of course, infinitely more durable. The fitting of sliding sashes to mullioned windows is always a failure, in point of appearance; the paraphernalia of boxing and casing forming a mass of material behind each mullion which causes the whole to look preposterously heavy, besides interfering with the light. The prevailing objection to casements is that they are not watertight, which is simply because they are not properly made. A casement window requires a groove or upright throating on the mullion as well as on the cill, and then with proper fastenings it may be as weather-tight as any lifting-sash. If a lifting-sash be fixed without any throating at the cill (as it often is in cheap jerry-built houses), it will let in the rain through the bottom just as surely as a casement without a groove on the mullion will let it in at the side. So that, in the interests of solid durable construction and joinery, we may wish that casements should be more used than they are.

The outward aspect of a building owes more than is sometimes suspected to the lights and reflections from the glass with which the windows are filled. A house before the windows are glazed looks blind, so to speak. Draughtsmen are well aware of the importance of the windows in getting up an effective perspective view, and very numerous are the dodges and experiments tried to ensure a bright sparkle from the windows in a competition drawing. In the actual building, the window, reflecting in part the sky tints and gleams of sunlight, seems to connect the edifice with the life and change and movement of the landscape. Tennyson has happily hit this in one of the few picturesque lines of a small poem written for Mr. Sullivan's music; where the lover, looking across the country on a fitful autumn day, sees in the distance the chamber window of his mistress, as, lighted by flying gleams of sunshine—

"It brightens and darkens and brightens like my hope."

* The inconsistency of going to all this trouble of lifting sashes "contrary to the laws of gravitation" was commented on in an otherwise not very sound letter about the blunders of modern house-building, addressed, a short time since, to a well-known daily paper, by Mr. Chas. Reade, the novelist. In this point Mr. Reade was right; though so ill-informed was he, that he did not even know the name of the window he was denouncing, and spoke throughout of "casements" where he meant sashes. Much of the letter was of a piece with this; but in England it is established that a successful novelist has a right, *ipso facto*, to talk any nonsense he likes about architecture or any other art, and the more dogmatic he is the more ready are his readers to take it all for gospel.

And so far as this outer expression given to the building is concerned, the quality and treatment of the glass is not of very much consequence, except that (to repeat what we have already urged) it is nearly always detrimental to the near view of a building to glaze it with large unbroken sheets of "plate." Much more might be done in the way of ornamental arrangement of the glass frames, either in wood or in lead, than is usually attempted in dwelling-houses, with very little extra expense; indeed, setting against this the high prices which have to be paid for large sheets of plate-glass, we might say at less expense; and by this means a scale is given to the building, and the windows are made to assist instead of diminishing its apparent size, while presenting at the same time an opportunity for a simple ornamental treatment, equally satisfactory from within and from without. Internally, a main question is, are the windows for prospect, or merely for light? Where the former is sought, of course the clearer the glass the better; where prospect is of less importance, the glass itself may be made an object of interest and a medium of decorative treatment. A very picturesque effect may be obtained by having a small portion of a window filled with stained glass (not too strong in tone); in a lofty mullioned window, for instance, a double transom, with small square stained-glass lights between the upper and lower lights, may contribute very much to the warmth and colour of an apartment, without interfering with light and prospect. Where stained glass cannot be afforded, variety of surface and texture may be given to ordinary plate-glass by an "embossed" diaper pattern on the plain glass. It is common to emboss on glass, the intermediate portions of which are subsequently ground, so as to obscure them; but the mere embossing on the *clear* glass has a very pleasing and delicate effect, when treated with a small and stiff conventional design: the embossing only showing fully at a certain angle seems to appear and disappear as the spectator changes his position, like the reflective lights on shot-silk. As to stained glass on an extensive scale, and of a high class, that of course is a separate art in itself, to be considered apart from mere window design.

We might say much more on the subject of windows, in reference to their accessories,—blinds, curtains, and other things, which are part of their furniture. We remember, however, one other use to which windows may be put. In one of Lord Lytton's novels ("My Novel," *par excellence*), an Italian refugee in England is visited by the parish parson, accompanied by some bulky theological volumes, for the purpose of converting him to the Protestant faith. The result is very succinctly told. "Dr. Riccabocca opened the window, and jumped out of it." Not wishing to be left in the position of the parson, we close our windows and our discourse on them before (we hope) our readers are tempted to follow Dr. Riccabocca's example.

THIS AND NEXT YEAR'S EXHIBITION.

Exhibitions have now become such permanent institutions, and apparently so necessary, as visible landmarks of the progress of trade and manufacture, and we wish we could say fine art, that no amount of care and thoughtfulness would seem to be too much in the future to make of them, not only *records* of what is doing, but promising indications of what ought to be done. No one will dispute that whatever may be the merits of the present year's Exhibition at South Kensington, it is in many respects imperfect, and that the mere tradesman and man of business have had in it the best of it, and that the artist and the artist-workman, who helped mainly to produce it, have had but a very second-rate place indeed in it and its glories. But the very express object of the whole idea of these Exhibitions is to show to the world what it is that the artist,—the thinking and designing artist and the working artist,—can accomplish with the raw materials provided by nature. This, as it seems to us, is an important consideration, and should in the future determine the kind and character of these now-to-be annual shows. If the whole business of them is to be but a mere art of selecting from the shop-windows the most showy and attractive and telling things, but without regard to their real *artistic*,—we repeat the word artistic—value, then, as it seems to us, little real benefit can come of them. It is simply an advertisement on a

large and conspicuous scale, and to be obtained for the mere placing of goods in a large shop-window without rent. But if, on the contrary, the art and fine art of the country is to be encouraged, and the artist who produces it is to be aided in a way which he cannot get for himself, then is it one of the best, if not the greatest helps that can engage the attention of those who have it in their power to help the world. Let us begin by reminding the reader of a matter or two in the now closing Exhibition. There can be no doubt that this is the age of machinery and mechanical inventions; so much so, indeed, that it would almost seem as though machinery was made for its own sake, and not for its resulting powers, or for the work it has to do. No one can have visited the late Exhibition without being struck with the wonderful powers of the moving machinery in it, and at the almost *lifelike* energies which it manifested. We would remind the reader, by way of illustration, of but one or two things in it, and as they bore more immediately on art matters. Everything in these days is driven by steam power, so that there is not, as in old days, any manual moving force. We would especially point to the "carpet-making machine," where was an ordinary drawing-room carpet in course of being brought into existence as if by magic, and without the help of human agency. Coloured reels of worsted, from which the carpet is made, and no end of wheels and pinions by which the work was done. There is simply,—and it was significant of the whole modern show,—a man *standing by* it to mend the threads as they accidentally break; were it not for this the machine might be started at six in the morning, and go on, without dinner-hour, to six in the evening, or all night as well as all day, in a locked-up room, so completely and perfectly does it act for itself and do without human agency. But here the wonder ceases, for the machine cannot think out the pattern, or select the colours; and it must strike every one as a somewhat strange thing that some little taste, to say the least of it, was not shown in the selection of colours and patterns. Why not a pattern *special for the place* and *occasion*,—something different from the ordinary shop show-window display to be seen everywhere and in every street fashionable enough to support a carpet shop? We should then have seen what the Government Art Schools are doing, and what they can produce, and by suspending close at hand a piece of carpet of ten-years-ago manufacture, we should see practically and tangibly what *progress* in carpet making and designing and manufacturing has been made since, and what hope there is for the future, and what the public purse is drawn upon for. We would suggest this for consideration to the Exhibition authorities and the Royal Commissioners. After looking with amazement at this poor bit of bright modern carpet in course of creation under our eye, let us go into the "Ceramic" department or passage, and have a long stare at some dingy-looking specimen of *hand* made carpet from the loom of some ignorant and utterly uninstructed savage from the interior parts of India, or Tunis, or Turkey,—from any place, indeed, where there is not machinery for doing everything, and where it is absolutely necessary for the workman to *think* a little of what is going on before his very eyes. It will be seen by a long and steady look that you cannot altogether leave even a carpet to a machine of wheels and spindles driven by a steam-engine.

We mention this first because *machinery* is the groundwork of this Exhibition, and the prime thing in modern advancement and progress, and to show that it is powerless really in art, and but a *help*, and not as here a master.

This machinery, therefore, it is that should first be looked at and examined, not only for its own sake, but as the moving, and, we had almost said it, the *inventing* power of modern days, and that which is gradually saving the labour of not only the *hand* of man, but of his head and his heart, too. The result of this machinery is modern art, and it has well nigh taken the place of the old art. It is the power of art-manufacture,—the destroyer of art! Machinery, and the false art produced by machinery, being then the main product, speaking generally, of this Exhibition, it may be asked, perhaps, whether there is or was anywhere in the whole collection anything (excluding for the present all note of the pictures) which is really the product of the *mind and hand* of the artist himself. Is there, indeed, a work of real and *bonâ fide* individual art in the whole place from end to end? Well, there are a few bits scattered here and there in obscure corners, and in out-of-the-way places, almost out of sight and notice, and looking very much as if they had got in by stealth. It is not a little singular that some of them had no number even attached to them. "Art-manufacture" has certainly triumphed at South Kensington: no one can dispute it. We hardly know what to direct the reader's attention to, or rather remind him of; but a little beyond the armour-room there are on a table a few fragments of modelling in terra-cotta of a head and some details, of course all done by *hand*,—they are all in a very much broken and fragmentary state, but they ought to be studied as they evidence what an art result is, and how wide apart it is from mere machine and manufactured work, and because these few dingy fragments contrast with another section of this show, viz., that of the vast collection from the warehouses and wharfs of some of the large pottery firms.

Passing these by, however, there is one thing in the "machinery" department connected with the potter's art which must not be overlooked. Carpet-making is but poor work to it. We refer to the machine and potter's wheel at work, and driven by a steam-engine, in one of the machinery outhouses. A man is at work, assisted by a boy and a steam-engine, in the manufacture of articles of pottery, with plenty of clay, water, tools, and everything that is handy and needful; and one would have supposed, considering the place he is in, and surrounded as he is by the highest and most learned of art influences, and examples, and help, that something at least suggestive of novelty would be forthcoming, and that man, and boy, and wheel, steam-engine, clay, water, tools, and altogether, and surrounded too, by "precedent," would produce something better than a "blacking" bottle. May we hope for something else another year; may we therefore suggest for next year's Exhibition a few changes and some additions and *omissions*. First, that the general idea of the Exhibition should be that the objects exhibited are to be considered as the *results of the action of the artistic mind* and hand on the rough and unformed materials provided by nature; *that machinery is a help and not a master;* and that it is only as a saving of mere labour power that it finds admission into art at all. This great principle, if true, of course makes the executive artist himself a something; and the public would then naturally ask for his personal and individualised recognition. Whose work is it? would be the constant question. The who exhibits it?—doubtless important and necessary, but a strictly subordinate and secondary one. Then we would propose that a broad and quite distinct line should be drawn between the works of pure manufacture and the works of genuine artistic production, between the products of the man as a machine, or men as machines, and that wherein the mind and hand of the individual artist have been at work as in a drawing or picture. And then, perhaps, more than all—for it is the great art secret of the future—a special encouragement should, as we think, be held out to the producers of art objects in *material*, such as objects in metal, wood, and stone, the working artist, the "Celinis" of modern days, if there be any. Such should be sought out, and specially recognised, and invited to contribute proof of their individual skill; for "Art" in the future, irrespective of "Style," will consist simply in the joint mind and *hand* productions of the artist workman in whatever material he may work.

ADVANTAGES OF IMPERMEABLE ROADWAYS.

We have received from Mr. Edwin Chadwick some interesting observations on the condition of the street surfaces of towns, and the means of improving them, and in which the writer expresses a strong opinion in favour of the Val de Travers asphalte. We have space for only a portion of the communication:—

I certainly expect that the saving of horse power, from the paving with the new material, of peculiar hardness, as yet unsurpassed, and, as far as I have seen, unequalled, by anything of the kind—the Val de Travers asphalte—will be more than one-half of that power, and consequently of more than half the dirt and dung in the streets, and that this pavement will nearly equal the tramways in this respect for public vehicles, whilst it will exceed tramways in general convenience, especially for all sorts of private carriages. Sir Joseph Whitworth, who has studied street economy and the means of street cleansing, and who is much struck with the new material, tells me that he anticipates that when extensively adopted, it will make way for the hot-air engine, with india-rubber tyres. A colleague of mine, of the Institute of France, who for the last ten years has ridden over a street paved with the Val de Travers asphalte in Paris, speaks of the great comfort in riding over it. The horses, on becoming accustomed to the tread, he says, do not certainly slip more, nor so much, and when they fall do not tear their knees as on the old pavements.

One advantage of gravel soils is the rapid discharge of surface water, and dryness after rainfalls. This advantage is possessed in a high degree by the impervious and even asphalte surface.

There is one peculiar evil attendant on the old system, which is the noise, the rattle, and the vibration of the traffic over them, to which strong people become accustomed, and do not mind, but weakly and ailing people suffer very much from it, and are sometimes obliged to leave town to avoid it. The removal of the sick over these paved roads is often attended with considerable danger from the rolling and shaking. At our General Board of Health, it was strongly represented that great injury, often fatal, was inflicted by the removal of some large classes of sick in common cabs, or in other common conveyances, over paved roads. Exhortations were prepared for popular circulation, that, on the occurrence of accidents in the streets, attended by the fracture of limbs, it is of the greatest importance that the patients should not be put into any common conveyance for their removal, but should be allowed to remain where they fall until a surgeon can be brought to direct special and safe means of removal by stretchers. In relation to the action of granite pavements on healthy persons, a professional friend declares that the loss of what he calls "brain force," from the vibration and disturbance of the nervous system in much riding over the old carriage pavements, is far greater than would be imagined. We know that for ladies of the well-to-do class it is found necessary at times to spread straw over the street, to prevent the vibration, and deaden the sound of carriages. With a pavement of this very remarkable new substance, which gives, with great tenacity, a sort of elastic surface, hard and inodorous alike in summer and winter, it is very much as if tan were always laid down before all the houses of a whole line of street. Tradesmen in Cheapside testify, as one characteristic of it, that, without shutting their shop-doors, they can now hear their customers, and can make themselves heard by them without shouting, as heretofore, to overcome the noise of the carriages over the granite pavement. Those living in such streets can now keep their windows open with little annoyance, either from noise or dust.

The macadam roads, in cities of great traffic, may be said to be huge stone mills for grinding granite dust. Some notion of the extent of the work done in this way in the metropolis may be formed from the fact that there are annually imported, and used there, 650,000 tons of granite, of which it is estimated that about 100 tons are imported in cubes, and that the rest is used as macadam. In addition to this material, large quantities of flint, and also other stones imported as ballast, are used. In Birmingham 50,000 tons of granite are put on the roads every year. Every year, therefore, so many tons of granite are ground in dry weather into dust with dung, which the winds carry about, and in wet weather into mud. The wear of the macadam roads is from 1 in. to 4 in. or more of granite annually. Westminster Bridge, it is stated, requires annually a coating of at least 5½ in. of the very best granite that can be got. The wear of any smooth road, by reason of the very smoothness, is comparatively inconsiderable, an example of which, I am informed, may be given, though of a street of secondary traffic, compared with our chief thoroughfares, the Rue Bergere, in Paris, where the result was observed. The street was laid with 2 in. of Val de Travers asphalte in 1854, which was lifted in 1869, when it was found to be reduced to 1⅞ in., but chiefly by compression, for it had, during the fifteen years lost only five per cent. in weight.

We found that these granite pavements very injuriously affected the working of the sewers. When the granite-dust is washed by rain into the sewers, it often forms an indurated surface, only to be loosened by the pick, and to be removed at much trouble and expense. This

sometimes occurred, even with tubular glazed pipe-sewers. To obviate this evil, we had traps carefully constructed at the mouths of the gully-shoots to arrest the granite detritus, for which, however, in times of storm or heavy rain they proved to be insufficient.

When the new granite or flint material for macadam is first laid down, it is a cruelty to horses, and a barbarism as respects carriages and carts, to impose upon them the labour of crushing it. The steam-roller is a relief to them, and an economy in getting a somewhat better surface, though still, to some extent, a permeable one for dung. But this implement aggravates waste and evil of another sort, produced by the vibration from heavy traffic. One great inconvenience in those streets is the frequent breaking-up of the pavement for the repair of gas and water pipes. I found in my own inquiries that the leakage of those pipes was very much proportioned to the heaviness of traffic, and was inconsiderable in the bye-streets and districts of little traffic, the vibration of the heavy traffic perpetually shaking the lines of pipes and loosening their joints. The escape of gas, besides being a waste, which in some districts was stated to amount to as much as 30 per cent., was attended by sanitary evil in the pollution of the air, and even in some cases of the drinking-water. So great in some districts was the saturation of the subsoil with gas, that, where the water-supply is on the intermittent system, and the pipes are alternately full and empty, the water-pipes were often filled with gas sucked in from the substratum through the loosened joints when the water was drawn out of the pipes. Mr. Milne, the engineer of the New River Company, to demonstrate this condition to me, and to show that to the water were frequently ascribed impurities which did not belong to its original and proper quality, took me early in the morning to the New Road, and applied a match to the tops of water-plugs, and lighted the gas that escaped from them. Instances were stated of people, on going with candles to the taps in houses to draw water, being surprised by a blaze of gas from them. The operation of the new steam-rollers, whilst it relieves horses, carriages, and ordinary vehicles from the labour of crushing and forcing down granite, and is in other respects economical for the macadam roads, is productive of injury and waste by a yet more powerful vibrating action than the ordinary traffic, and greater disturbance and rupture of the system of pipes beneath the surface. Some of these rollers weigh as much as thirty tons each. I am informed that the gas and water companies in London and in the provincial cities have had serious cause to complain of the use of these rollers, which bring to bear the weight of some twenty or thirty one-horse loads upon one fulcrum, and have fractured large pipes deeply laid, and have also injured the house connexions.

BIRKENHEAD NEW SCHOOL OF ART.

Mr. John Laird, M.P., has publicly handed over to trustees the new school of art which has been erected at his sole expense at the entrance to Birkenhead Park, and close to the hospital which Mr. Laird presented to the borough a few years ago. The ceremony of handing over the new school took place in the large upper room of the building, in the presence of a numerous and fashionable assembly, including the Earl of Derby, who gave an address on scientific education. The entrance to the park is one of the most central sites in Birkenhead, equally convenient for the outlying districts of Rock Ferry, Tranmere, Holt-hill, Oxton, Claughton, and the various manufacturing and industrial establishments along the margin of the docks, Wallasey, Liscard, and Seacombe. The building is plain and simple in style, three stories high, constructed of brickwork, with a freestone cornice and parapet, over the centre of which is a small segmental pediment for a clock. The front stands some 30 ft. back from the main thoroughfare, and the whole is surrounded by a wrought-iron railing, with the space within the rails levelled, sloped, and laid down in grass. The circular tympana over the six principal windows to the front are filled in with sculpture, in *alto relievo*, representing Mechanics, Shipbuilding, Painting, Sculpture, Navigation, and Architecture. A projecting portico occupies the centre of the façade, approached by a wide flight of steps, and flanked by two caryatid figures in York stone supporting the entablature, and emblematic of Painting and Sculpture. The portico opens with a wide corridor traversing the principal floor to the staircase at the back, communicating with the basement floor below and the large room above. The basement floor is on a level with the natural surface of the land, and is laid throughout with a floor of cement. It is 10 ft. high in the clear, and contains a keeper's room and kitchen, chamber for heating apparatus, lavatory, and class-rooms. The principal floor is 13 ft. 6 in. clear height, and contains on one side a room for the life class 30 ft. square, capable of sub-division by curtains, and lighted by a sunlight in the ceiling; on the other side, rooms facing the north for the head-master, with a library and lavatory facing the south. The upper floor contains one large room, 70 ft. by 30 ft., and 20 ft. high to the ceiling, to be set apart for the elementary class. One end of this apartment will be partitioned off for a painting-room by wooden screens, movable at pleasure, such as are in use at South Kensington. The whole of this floor is lighted exclusively from the north with upright double-hung windows and corresponding skylights. At night the painting-room will be lighted by a sunlight, and the large elementary-room by standard lights fixed to the tables and desks. The building will accommodate about 200 students at one time. The large upper rooms and staircase are provided with syphon ventilators; all the rest of the apartments are provided with upright shafts and louvered casements, according to a plan carried out by the architects in concert with Dr. Baylis, the medical officer of Birkenhead, and it is expected the ventilation in every part of the building will be perfect. All the windows and skylights to the north are provided with sliding shutters to admit or exclude the light above, below, or in the middle, at pleasure. A light cast-iron staircase is constructed from the head-master's-room to the floor above, so as to facilitate control and supervision. The whole of the building is heated by means of hot water in metal pipes, with the addition of open fireplaces in the keeper's apartments and one or two others. There is ample space on the land given by Mr. Laird—some 1,400 square yards—to the rear of the building for the erection of a commodious lecture-room and laboratory entering from the main landing of the staircase, and additional class-rooms may also be obtained by extension on the east and west sides.

The work has been executed by Mr. Alexander Blakley, from designs and under the superintendence of Messrs. W. & J. Hay, architects. The iron railing and lamps were executed by Mr. Henson, the hot-water apparatus by Messrs. Harrison, and the carving by Mr. Rogerson.

The cost of the whole, inclusive of the land, will be upwards of 4,000*l*.

SOMEBODY WRONG AGAIN.

The following is a list of the tenders delivered for re-building houses (Nos. 22 to 27), in Princes-street; also at the rear in Bell-court, Mile-end New Town. Mr. G. H. Simmonds, architect:—

Bracher & Son	£3,500	0	0
Harrison & Son	2,850	0	0
Durnford & Langham	2,779	0	0
Pink	2,682	0	0
Brown	2,640	12	8
Wood, F. & F. J.	2,533	0	0
Josolyne	2,481	0	0
Read & Son	2,389	0	0
Upson & Davey	2,368	10	0
Palmer	2,355	16	6
Morter	2,243	0	0
Pavitt	2,230	0	0
Howard	2,221	0	0
Crook & Wall	2,180	0	0
Hugheeden	2,175	0	0
Kipps	2,171	0	0
Wright	2,150	0	0
Leatherdale & Son	1,995	0	0
Merrion	1,935	0	0
Waters	1,935	0	0
Robins & Co.	1,869	0	0
Brugger	1,843	0	0
Groome	1,700	0	0

PLYMOUTH GUILDHALL AND COURTS.

The buildings illustrated in our present number are being erected on an excellent site in the heart of the town, which site was early secured for this purpose. So long ago as 1851, a new Guildhall, in place of the present small and inelegant structure (erected in 1802), was contemplated, but a competition then advertised was set aside through the action of some of the town-council of that period.

In 1869, however, architects were formally invited to submit designs for the new buildings, and between twenty and thirty gentlemen responded. On the recommendation of Mr. Waterhouse, as professional referee, the design now being carried out was accepted by the corporation of Plymouth.

The buildings are in two blocks, by which arrangement the old and incongruous houses on either side are shut out from view. On the north side will be the municipal offices, and on the south the Guildhall and Courts, shown in the perspective view, and of which we give a plan. Between the two blocks will be a public place, averaging about 100 ft. in width. At the east end is the fine old fifteenth-century tower of St. Andrew's Church, and at the other end is Westwell-street, a new and important thoroughfare of the town.

The new buildings are intended to harmonise in some general characteristics with the massive tower of St. Andrew's, the wings being treated in broad and simple masses, leading up to central features of appropriate richness and dignity. The local materials, of which the exterior will be chiefly constructed,—viz., granite and limestone,—rendering such treatment desirable, as general elaboration could only be obtained at very great cost.

The large hall, which is intended to seat 2,600 persons, will occupy the centre of the façade on the south side, with the proposed law courts at the Westwell-street end, and the police-court and station-house at the eastern end. The great hall will be entered immediately from the public place through a deeply-recessed central double doorway and side porches, and will have a nave 58 ft. wide, with narrow aisles on either side, the extreme length being 146 ft. The aisles will open into the body of the hall, with two arcades of seven arches each, the pillars supporting which will be of polished grey granite, 2 ft. 9 in. in diameter.

The traceried windows of each clearstory will follow the number of the arches below. There will be seven separate doorways for ingress and egress. At the west end will be an orchestra, in connexion with which will be a suite of anterooms, available for performers and others; and at the east end will be a gallery for the public, to seat about 300. The hall will have a semi-circular boarded roof.

The internal dimensions of the police-court will be 46 ft. by 38 ft., and adjoining will be rooms for the magistrates, magistrates' clerk, attorneys, and witnesses; and in the rear will be the station-house, police muster-room, reading-room, &c.

Each of the courts at the Westwell-street end will be 49 ft. long by 38 ft. wide, and will have separate entrances and rooms for barristers, attorneys, and witnesses, with distinct accommodation for the public in galleries at the ends of the courts, approached by a stone staircase in an octagonal angle tower.

An important feature of this pile of buildings will be the tower at the south-west corner of the group, which will be nearly 200 ft. high to the vane.

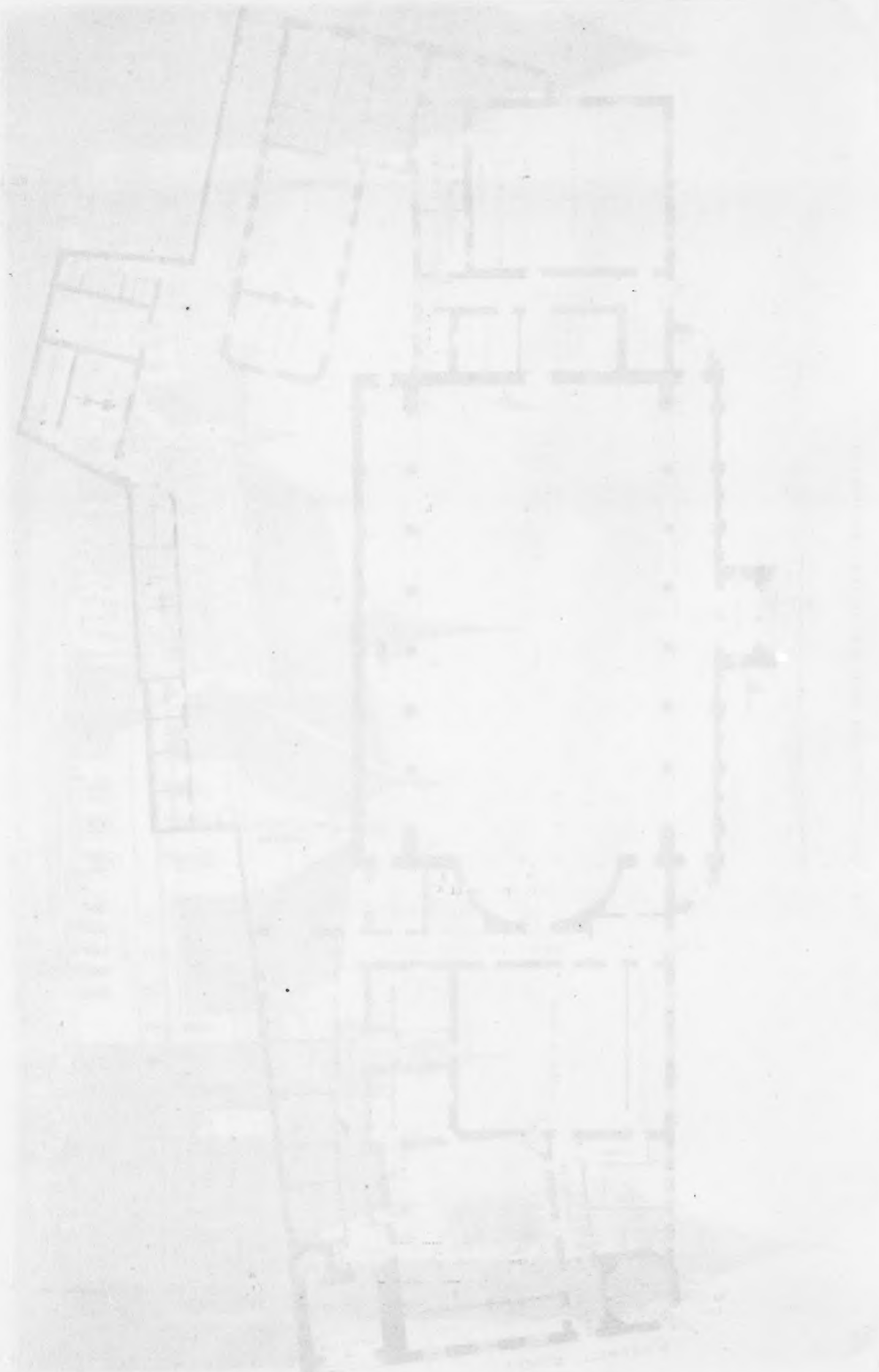
The council-chamber and municipal offices (now in a comparatively forward state) occupy a portion of the northern side of the public place, a space at the Westwell-street end of this side having been preserved for future public uses. This municipal structure is for the most part two-storied, the council-chamber forming the central feature, and corresponding in detail somewhat with the great hall on the opposite side. The accommodation of the north block will include offices for the town clerk, chamberlain, surveyor, school board, &c., with strong-rooms, store-rooms, and a large vaulted muniment-room.

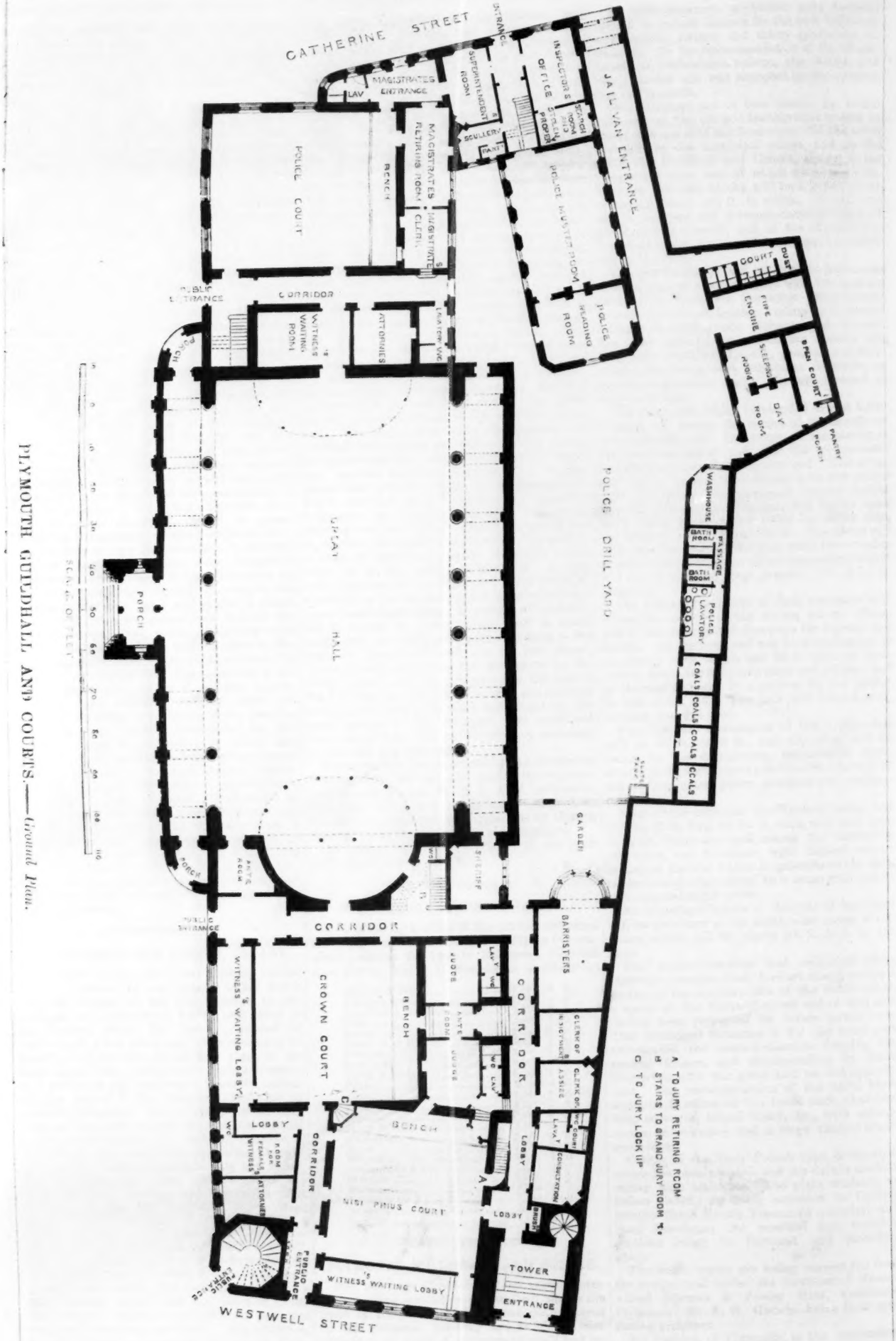
Gothic, of the Early French type, is the style which has been adopted, and the details are bold rather than elaborate. The plain surfaces, as before stated, are being executed in Cornish granite (from Messrs. Freeman's quarries) and local limestone; the moulded and enriched portions being in Portland and Mansfield stone.

The entire works are being carried out from the designs and under the direction of Messrs. Alfred Norman & James Hine, architects, Plymouth; Mr. E. W. Godwin being their consulting architect.

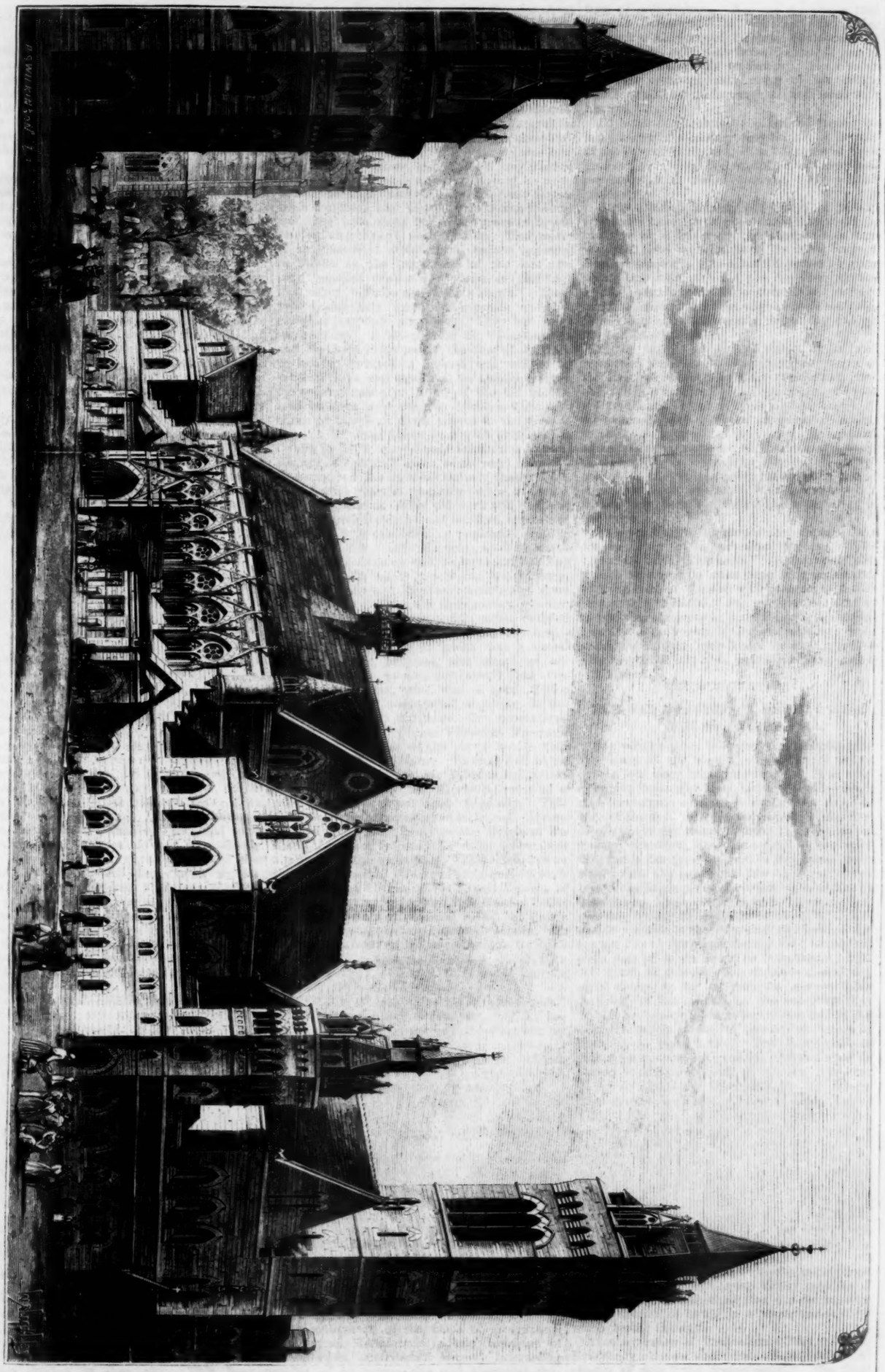
Mr. Pethick, of Plymouth, is the contractor; and the contract amount is 32,475*l*.

The buildings were commenced in June last year, and will probably be completed in the summer of 1873.





PLYMOUTH GUILDHALL AND COURTS.—*Ground Plan.*



PLYMOUTH GUILDHALL AND COURTS.—Messrs. Alfred Norman & James Hine, Architects.

ARCHITECTURAL AND ARCHÆOLOGICAL LITERATURE IN IRELAND.

Ireland, though rich in archæological and antiquarian literature and writers, has made but poor progress during the nineteenth century in the literature of architecture. Her round towers have provoked more controversy than the authenticity of the letters of Junius or the poems of Ossian. Her yet living language is still exciting an interest which appears to be growing deeper, even outside her own shores, and for German philologists, as well as for British, it is an enticing and entrancing field of inquiry. Numerous and many-sided have been the works on Irish history published, and more numerous still are the materials of this history still existing in MSS. in British and Continental libraries, and scarcely less plentiful are those reported to be missing or lost. Englishmen, led by choice, accident, or public appointments to Ireland, have been many for some centuries back, and a fair quota of these have been irresistibly drawn to the study of Irish archæology, philology, and antiquarian matters. Yet in the superabundance of these inquirers, Saxon and Celtic, the progress or growth of an Irish literature of architecture proper has been small indeed. Very few Irish architects have shown any energy in aiding the study of their own profession, in the sense of contributing to the literature of its varied branches. Odd and intermittent papers have been read in public institutions from time to time, interesting in their way, but these contributions go a very short way in the formation of a literature of architecture the emanation of Irish intellect.

Vallancy, though not a native, was a naturalised writer on Irish themes. He was a military engineer, originally of the army, but he became by location and association in Ireland, an archæologist and antiquary, and even a philologist. His works were not of an architectural character, save so far as archæology is connected with it. He wrote, however, a small work entitled "Field Engineering," and a Treatise on Stonecutting. Ledwich was a historian and antiquarian writer, and a native; Sylvester O'Halloran, Taffe, Leland, Beauford, Plowden, Baker, O'Connor, Keating, MacGeoghegan, Kelly, Moore, Curry, Lawless, O'Sullivan, and others, were historians. In more recent times we have another class of historical and antiquarian writers, whose works are very interesting, John O'Donovan, and Eugene O'Curry (the great Celtic scholar), Sir W. Bentham (Ulster King-at-Arms), John D'Alton, the Rev. Cæsar Otway, Sir William Wilde, Richard Brash, John Windele, J. R. O'Flanagan, Francis Wakeman, Roche, George Petrie, Graves, Todd, and some few others whose names do not immediately occur to our mind, but whose works are of a similar useful cast. All these latter writers, with a quota of other local historians, confined their labours to archæological, historical, and antiquarian studies. None of them, that we are aware, were architects by profession, nor have they written on architecture proper, or in elucidation of Irish architecture, save in the descriptive manner of historians and antiquarian observers.

From the days of Giraldus Cambrensis, otherwise Gerald Barry, who accompanied Henry II. to Ireland, in the twelfth century, down to the days of Sir James Ware and his contemporaries, Irish history, language, manners, institutions, and ecclesiastical remains, formed the chief fields for study in Ireland. The Ogham character, the Ossianic tale, the Brehon edict, and the Round Tower mystery, and other cognate subjects, were taken up by turns, and formed a continuous body of writers, until the present hour. Architecture proper was left out in the cold as an uninviting subject. A few professional men, however, with others allied by tastes to architectural pursuits, look now and then to the subject. There is a manuscript work in the British Museum, by an Irish architect, John Aheron, entitled, "A General Treatise on Architecture, divided into Five Books." It consists of 176 folio pages, with this epigraph: "This work was written and drawn with pen and ink, and finished by the 13th of April, A.D. 1751, by John Aheron." The history of this writer is unknown. George Semple, an architect who flourished in Dublin between 1750 and 1780, wrote a work on "Building in Water," and a Diary of his Re-building of Essex Bridge in that city. This book was illustrated with many copper plates. It was published in 1776, and is well known. James Murphy, an architect, wrote on "The Principles of Gothic Architecture," a book in which he advanced some curious theories about the origin of the pointed arch. James Gandon, an Englishman by birth, but a celebrated Irish architect, during the Irish Parliamentary period in Dublin, wrote some papers on "The Progress of Architecture in Ireland." Francis Grose (the Captain), who published the Antiquities of England and Wales and Scotland, also commenced a work on the "Antiquities of Ireland," illustrated by his own sketches; but dying in Dublin in 1791, his work was continued by his nephew, Daniel Grose, and Edward Ledwich, the Irish historian. It may be mentioned here that James Gandon, the great Anglo-Irish architect, and Grose, were bosom friends, and they both sleep in the one grave in Drumcondon churchyard, near Dublin. Two works of an illustrated architectural nature appeared in Dublin in the latter end of the last century, entitled Malton's "Views of Dublin;" the other, "Poole and Cash's Views." These two books had some letter-press, and the plates were well engraved. They are very scarce now. A description of "Gentleman's and Builder's Price-book," the first of its kind, we believe, printed in Ireland, was written by William Stith, and published in Dublin early in the present century. Some of the old race of Irish builders were wont to calculate their estimates by this book down almost to the present day. A Dr. John Rutty, in a work published in Dublin in 1772, an "Essay towards a Natural History of Dublin," gives some very useful information on the building stone of that county, the different quarries, painting earths, minerals, and petrefactions. This old work will be found useful to Irish architects and builders, and others connected with the building profession even in the present day. John Morrison, an Irish architect, wrote a little on architectural and building matter, in the latter part of the last century, His son Sir Richard Morrison, contributed some papers to the literature of architecture; he also published a work early in his career entitled "Useful and Ornamental Designs in Architecture, &c.," prefixed to which was a narrative of the rise, progress, and extent of architecture; but we are not aware that the son of the latter, who was a good Tudor Gothic architect, contributed anything to the literature. The Morrisons for generations were architects. William Vitruvius Morrison, the younger member of the above family, died young, on his road to fame. Thomas Bell wrote a "Treatise on the Gothic Ecclesiastical Architecture of Ireland," for which he received a prize from the Royal Irish Academy. This work was more historical than technical. Henry O'Brien wrote an "Essay on the Origin of the Round Towers of Ireland," for which he received a prize from the same body. This work was an historical one also. George Petrie wrote a work also on "The Origin of the Round Towers of Ireland." He received a prize, too. Neither Petrie nor O'Brien was a professional man; but Petrie was not ignorant of architectural details. He also wrote several antiquarian sketches for Irish journals, and a sketch of the Rise of the Fine Arts in Ireland. Henry O'Neil wrote on the "Ancient Crosses of Ireland."

The "Life of James Gandon, the Architect," written by the late T. J. Mulvany, R.H.A., appeared about 1846. It was an interesting volume as far as it went, but it was chiefly confined to an account of the architect's career in Ireland, and the public works on which he was engaged. Mulvany was an artist, and not an architect.

In the periodical literature of Ireland for the last eighty years, various minor writers have contributed on archæological and antiquarian subjects.

William Beauford was acquainted with architectural detail as well as antiquarian subjects. He contributed papers on "The Civil, Military, and Ecclesiastic Architecture of Ireland," and on "The Theory of Columns," and on "Gothic Roofs" (their pitches), in the "Anthologia Hibernica," 1793-4. In the *Dublin Penny Journal* of 1832—6, the *Irish Penny Magazine* of 1832, and in the *Irish Penny Journal* of 1840-1, various antiquarian articles appeared, some from the pens of writers we have already mentioned, and from unknown hands.

A schoolmaster, of the name of Armstrong, and Samuel McSkimmin, a local historian of Carrickfergus, contributed several interesting articles, of an antiquarian and historical character.

Neither Cooley nor Ivory, though good architects practising in Dublin in the latter part of the last century, contributed aught to the literature of architecture. Nor are we aware that Francis Johnston, who founded the Royal Hibernian Academy of Painting, Sculpture, and Architecture, ever contributed with his pen to the literature of his profession. He was an excellent architect, and many of his public buildings still attest thorough acquaintance with his art.

Of latter-day architects in Ireland during the last quarter of a century very little can be said in the way of literature,—the literature of their profession. With the exception of occasional papers read at their Institute, they publish little.

Some Dublin, Belfast, and South of Ireland architects have given proof that they could do useful work in this way; but whether it is from want of time or reluctance, or other causes, Irish architects in general of the present day are doing but little with the pen for their special guild. In our brief review of this subject we have omitted some names that might have been mentioned, but none that would materially change the aspect of the case.

A few words by way of finis. In a back volume of the *Builder*, some scattered notices of the lives of a few previously overlooked Irish and foreign architects and engineers of note will be found. Some of these notices might be summarised, and included in the new Architectural Dictionary. If they cannot be given in alphabetical order, owing to the advanced state of that work, they could be included in an appendix to the volume, with the particulars of other unnoticed architects, "waifs and strays" which may turn up before the completion of the work.

As we write, an announcement appears in a contemporary of a promised volume, "The Lives of Irish Architects," to comprise also foreign ones of note once practising in Ireland, with a sketch of the rise and progress of architecture in that island. Such a volume ought to be made as complete as possible, and the members of the profession in Ireland who may have materials or who may know in what quarters such may exist might do well in assisting such a publication.

THE VENTILATION OF SEWERS AND HOUSE DRAINS.

The volume of air in sewers varies continually by reason of the varying quantities of water poured into them from time to time. It is well known to those who have had to do with sewers that the volume of sewage varies from hour to hour of the day. Repeated gaugings of the flow of sewage in dry weather, when the quantity of sewage, therefore, is not influenced by the rainfall, but is the quantity used in the houses, have shown that the maximum flow during some one hour of the day is nearly three times the minimum flow during some other hour of the same day, meaning by day twenty-four consecutive hours; and so variable is the flow that one half of the sewage due to the whole twenty-four hours will often pass off in six hours, or thereabouts; and it is usual to calculate the requisite size of any given sewer, so far as respects sewage independently of the rainfall, on the condition that it shall be capable of carrying off one half of the flow of a whole period of twenty-four hours in from six to eight hours. This fluctuation is caused by the varying quantity of water used in houses at different times of the day. It was stated to the Board of Health by Mr. Henry Marten, the engineer of the Wolverhampton Waterworks, that in that town about three-fourths of the daily supply of water were given between the hours of eight in the morning and eight in the evening. Mr. Hawksley found at Salford, in the year 1862, according to his evidence in Parliament on the Salford Improvement Bill, that the draught of water between eight a.m. and noon was from two to two and a half times the average quantity of the whole day, and that in the night it was not more than one-fourth of the average quantity.

These observations on the varying hourly flow of sewage and on the varying hourly quantity of water used in houses, show that the fluctuation of the volume of liquid in a sewer varies very much during the day.

Another cause of fluctuation is the rainfall. Everybody knows that immediately after a shower of rain "the drains smell." The foul gases of the drains are, in fact, at those times being forced out of the drains by the influx of water. When the water in a sewer is rising it compresses the air above it, when it is confined,

and, reacting, as all elastic bodies do, with an equal force to that which has been applied to them, the air forces its way into the houses through kitchen sinks, traps, and water-closets. No trap can prevent this action. Traps will not of themselves prevent the escape of sewer air into houses; indeed, traps are very deceitful things. The old "bell trap," the very worst form of trap we know, is very properly going out of use; but even the best kinds contain no more than about 2 in. depth of water to resist the expansive action of the air within the drains; and it must be remembered that this compression and subsequent expansion of the sewer air, caused by the rise of water, are frequent, and daily, and therefore that the ventilation of sewers and drains is an absolute necessity; or, if it seem that these reasons do not actually prove the case, there are others which we shall mention further on which will do so.

When this necessity is admitted, the next practical consideration is the best manner of ventilating the sewers and drains; but before we proceed further, we will say that we think whenever the ventilation of sewers is considered, it should be considered in connexion with the ventilation of house drains. The conditions of all towns are not alike, and the system of ventilation good for, say, London, Liverpool, or Manchester, will probably not be the best for smaller towns; and, in taking a general view of the subject, it ought to embrace all conditions of various towns. Where the sewers are comparatively large, which is the case where they carry off the whole rainfall of the area of the town in addition to the sewage, the house-drains enter the sewers at a level above the surface of the ordinary flow of the sewage; and in that case, if you ventilate the house-drains, you ventilate the sewers at the same time; whilst, where the sewers are comparatively small,—that is, where they do not carry off the whole rainfall, but where there are storm-overfalls, or where old surface-drains are made to take away the rainfall direct to its outlet,—then an influx of water soon raises the sewage above the mouths of the drains, and then the sewers need a separate system of ventilation; and this has been done by compelling the sewage-gases, on their escape into the atmosphere, to pass over and amongst the pores of charcoal. Mr. Latham has arranged the charcoal in a spiral form. He had, we think, previously arranged the trap horizontally, with openings alternately, at the right and left side, so that the gases should pass from side to side in their ascent; and this spiral form seems to be a modification of that form, and offers less obstruction to the current of air. Mr. Jacob has an arrangement by which he brings a large surface of charcoal into contact with the escaping gases, consisting of one deep box, instead of several shallow trays. Mr. Robt. Rawlinson first applied charcoal to the deodorisation of sewage-gases in 1856, if we remember, and placed the charcoal-basket vertically in the wall of a man-hole, and made a separate outlet adjoining it, thus combining the manhole and ventilating-shaft in one structure, and protecting the charcoal from being wetted. His system was early described and illustrated in our pages. It is important that the charcoal be kept dry, although, such is its power of self-renovation, in some experiments made by Dr. W. A. Miller under the direction of the Metropolitan Board of Works in 1866, he found that the substance was still effective, after having been in the sewer for six months; and, when dried, 100 parts of it gave off 19·7 parts of water.

Dr. Alfred Carpenter read a paper in June, 1869, "On the Influence of Sewer Gas on the Public Health," and after saying that the general adoption of water-closets and the consequent introduction of drains into houses often brought sewage gas into them, said that the mischief had arisen from the neglect of a natural law; viz., not providing for exits as well as entrances; and as to trapping without providing an exit for the sewer gas to some place where it is harmless, said that merely trapping one place or one town, and driving the gas elsewhere, was a selfish kind of way, and that the public suffered by it. Seeing the evils of this system, he said, the Croydon Local Board determined to adopt the principle of opening the extremity of every sewer and every branch or house drain in connexion with the sewer, and *make every house ventilate its own house-drain*; and that by this means, and by making frequent openings into the sewers so as to allow a constant and continuous current of air, the effects of sewer gas had been entirely obviated, and the consequences removed, in those portions of the district to which the law was made to apply. Dr. Carpenter stated that the nature of sewer gas had been well pointed out by various chemists and medical authorities, and that all concur in the belief that dilution destroys it; and said that a most perfect circulation of air had been effected in his district by compelling every new house to have ventilation for itself, whereby the current of air is inwards at the ground level, and outwards at the top of the ventilating pipe into the atmosphere above the roofs of the houses. "The soil-pipe is continued upwards, in a straight line above the level of the pan, between the trap and the sewer; and it is made to terminate by an open extremity above the eaves of the house, away from the window, and not close to or level with the chimney. Every connexion with a sewer requiring a trap has that trap guarded from the consequences of pressure by a ventilator, similar to the soil-pipe, being placed as close to the trap as possible." The result of making these numerous openings at the higher points is to promote a rapid circulation through the sewer, by which all gas is removed as quickly as it is formed, and is diluted and oxidised, and no concentration can take place. "Differences of temperature, density, and moisture, will always be sufficient to determine a circulation, provided entrances exist for fresh air, as well as exits for that which has passed through the sewer. The principle to be obviated is stagnation, whether of solid, of liquid, or gas: deposit must not be allowed: fluid must always run off: let there be also innumerable openings near the tops of the houses, and it may be safely assumed that no stagnation will exist in the sewers themselves."

Towns vary in the manner in which the houses are built, but probably we are not far wrong in stating that the great majority of towns are so built as to allow of such pipes as we have mentioned, viz., special ventilation pipes at the heads of house-drains, being carried up to some few feet above the roof,—say 3 ft. or 4 ft.,—and away from bedroom windows. Some people have supposed that the ordinary rainwater pipes might be advantageously used for this purpose, but they very often terminate in close proximity to bedroom windows, and always below attic windows; and, besides, when they are most wanted to perform the office of ventilating the drains, their throats are choked with rainwater.

If such a system as that described by Dr. Carpenter were to be generally established in all towns, we should go a long way towards getting rid of this part of the sewage difficulty; but to accomplish it further direct legislation is necessary; and we think it is a pity, as we said in our first notice of the Royal Sanitary Commissioners' Report, that they did not make some suggestion of direct legislation on this subject; and as they have not done so, we have undertaken to offer some remarks for consideration.

SILCHESTER.

In the north of Hampshire, on the border of Berkshire, in a somewhat secluded district in which woodland is a prominent feature, stands Silchester, or *Selchester*,* as pronounced by the peasantry. It is the site of the Roman town Calleva or Calleba of the Itinerary of Antoninus, and of the list of places in Britain given by the Geographer of Ravenna. Its extent may be conceived when it is stated that the circumference of the walls yet standing in a fair state of preservation measures nearly two miles. It has of course from time to time attracted the attention of antiquaries, and it has been occasionally visited by the more adventurous sight-seer, but until the present day the extensive area within the walls has remained, as it has existed from probably two or three centuries after the departure of the Romans, in cultivation as farm land. Thanks to the Duke of Wellington, we are now relieved from speculation, and can understand something of the town itself and of its arrangements and general character. Under his grace's countenance and wishes, a few years since the Rev. J. G. Joyce commenced excavations, which are now proceeding, and are luminously reported on, up to 1866, in the "Archæologia," vol. xl.†

The first question that arises in the mind of every one who visits a place of such extent and importance, is what was its ancient name, and what remains of its history. Of the name there should be no doubt, for it is obviously, as before stated, the *Calleva* or *Calleba* of the Itinerary of Antoninus rendered more marked by the annexed appellation of *Attrebatum*, both in the Itinerary and in the Ravenna list. Of its history absolutely nothing is known. Three inscriptions have been found, one of which gives the name of Hercules of the Segontiaci, to whom an altar was set up by one T. Tammonius. The Segontiaci are mentioned by Cæsar, and their territories joined those of the Attrebates; so the inscription is just such as might have been expected from the locality. Mr. Joyce is daily adding something to our hopes that there may yet be found inscriptions that will remove the obscurity in which this important place is shrouded. Fragments of lettered stones are turned up by the excavators from time to time, which, from the bold and well-cut letters, seem to indicate dedications of a public character; and in the *Forum* recently laid open, is a large square stone, from which, at some remote period, was abstracted a bronze plate which had been riveted with lead. Without doubt it bore a public inscription of consequence.

It is rather remarkable that Silchester should ever have been deprived of its right to represent the ancient *Calleva*. Yet old writers, from Camden downwards, transposed it with *Vindomis*, a *mansio*, or *mutatio*, between Calleva and *Sorbiodunum*, Old Sarum. This would never have been the case had they considered that the places which commence and terminate the *itinera* were invariably of importance; they were, in fact, towns and walled. The intermediate stations were usually establishments, more or less extensive, to supply horses and carriages for the public service, to rest the soldiers on their march, and for the general purposes of traffic. Remains, therefore, will always yet be found of the former; and it is essential they should be apparent, as at Silchester, which thus stands obviously prominent. The placing Calleva at such places as Henley and Wallingford denotes as much want of care and judgment in studying the system on which the *itinera* of Antoninus are founded as making Calleva and Vindomis change places. The importance of the place is evidenced by its heading two *itinera*, and closing two others; while in yet another, that from Regnum to Londinium, it is placed midway, immediately after *Venta Belgarum*, Vindomis being naturally omitted, as lying out of the direct road. Hobsley, with his usual sagacity, detected the error of his predecessors, and clearly exposed it; but his work, the "Britannia Romana," was probably not available to those who subsequently adopted the old mistake.

Of the three inscriptions recorded as found in past times, one is funereal; the other, as observed, to Hercules of the Segontiaci; and the third is to Julia Domna, the wife of Severus. Among the fragments recently excavated by Mr. Joyce are the letters CIVI., probably for CIVITAS. In another, the word EIVS (*ejus*) is alone eligible, but in both the letters are extremely well cut, and of a rather early form. It is reasonable to expect that others may be brought to light, as only a small portion of the extensive area is as yet laid open; and the site of the cemetery, which, of course, is outside of the walls, has not yet, I believe, been discovered. From the cemetery, wherever it may be, came, no doubt, the sepulchral inscription given by Camden and Horsley.

To the streets and dwelling-houses described and illustrated most faithfully by Mr. Joyce, is now to be added the Forum, the foundations of which, completely cleared, extend perhaps 150 ft. in length by about 30 ft. in width. It was surrounded by colonnades and appendages, which bespeak considerable grandeur of design; and though the agents of destruction have been unusually industrious in their abstractions of the building materials, enough remains to reveal the extent and magnitude of Calleva, and to warrant the Duke of Wellington in prosecuting the researches which have hitherto been so successful.

Mr. Joyce has not yet fully examined the walls and gateways; but he has succeeded in correcting all who have gone before him in respect to the principal *vias* which passed through the town; and he has discovered that what was supposed to be a gap broken in through the wall near the amphitheatre was really the north-east entrance from Londinium to Aquæ Solis by Vindomis and Sorbiodunum.

Too much praise cannot be given to the Duke of Wellington for his liberality and excellent

* It is so spelt in Baxter's "Glossary." Camden says the word signifies *a great city*.

† An account of a visit to Silchester has been given in the *Builder*.—Ed.

feeling in thus instituting and prosecuting researches necessarily tedious and expensive, and he will receive the sincere thanks of all who can appreciate our ancient national monuments, and estimate their historical, artistic, and general scientific value.

Simultaneously with the excavations made at Silchester may be noticed the investigations being made by Dr. Stevens at Finkley, between St. Mary Bourne and Andover, where Sir R. C. Hoare was, I think, the first to place the site of Vindomis. The Rev. E. Kell and Mr. C. Lockhart, a few years since, discovered the foundations of buildings; and Dr. Stevens is now adding to the revelation of remains which justify us in being quite satisfied upon this site stood the *mansio* or *mutatio* which, at this very distance, under the name of Vindomis, comes next to Calleva. C. Roach Smith.

"WHERE IS THE PIMLICO CLUB?"

Sir,—In your issue of June 10th (four months ago), Mr. Hodgson Pratt, in answer to the above question, said,—"The plans are now being prepared, and measures taken to commence the work."

Surely he cannot accuse us of impatience in putting the question again,—more especially when the fact is mentioned, that, in the meantime a large building, intended for schools, has been erected upon the site originally intended for the "Club" in Ebury-street.

We earnestly hope Mr. Hodgson Pratt has not been again compelled to resort to the "slow, laborious, and disagreeable process of begging."

However desirous we may be, with Mr. Pratt, to see the institution a "model one of its kind," sorry should we be, in such a cause, to try to divert the stream of charity from its legitimate channel.

The 2,000*l.* so generously given—without begging—viz., 1,000*l.* from the late noble Marquis, and 1,000*l.* from the equally noble and generous "Anonymous," is a "good round sum," with which might be erected a spacious building.

Then, having something to look at, and an assurance that the "Club" would be conducted upon "popular principles," the working men and other inhabitants of the locality, might be induced to put their mites towards it, and their "shoulders to the wheel" in right earnest.

George Wyeth,
One of the Local Committee who are "out in the Cold."

NOT TOO LATE YET.

Sir,—The process of demolition is going on very slowly at the bottom of St. Martin's-lane. Do give the Metropolitan Board of Works a brush-up; and now that they are refreshed by their holiday, and elated by the success of their chairman in another walk of life, urge them seriously and rapidly to entertain the once-rejected idea of setting back the lane front of the new Provident Institution Building to the line of the houses above the throat of the Lane. The other two houses will follow in due time; but the square unrounded corners of St. Martin's-lane with Chandos-street and Hemming's-row, and the narrow pavement, are a constant and ever-recurring source of personal concussion and vehicular danger.

It is stated that Mr. Vulliamy is alive to the value of the improvement. A little pressure from without will doubtless be of material assistance to him if he will put his convictions before the Board *before it is too late.* W.

PROGRESS IN PORTLAND ISLAND.

Portland Island has many peculiarities, which are not likely soon to die out. Although one medical officer would seem to be sufficient to represent the little local Board of that rocky eminence on the coast of Dorset, it has now, as the natural result of divided councils, obtained the representation of two, though it will hardly venture on consulting more than one of its doctors. It is a pity that Portland cannot proceed with her sanitary works without developing into undue prominence the physical pugnacity of certain members of her local Board. Last week the plans and estimates were brought up for consideration, relative to supplying Portland with water, and for necessary drainage works. The following tenders were read:—"Thorough," 2,345*l.* 16s. 3d. for drainage, and 3,887*l.* 1s. 11d. for water supply; "Sanitas," 1,090*l.* for drainage, and 3,006*l.* 16s. 10d. for water supply; "Experience," 2,600*l.* for drainage, and 8,500*l.* for water supply; "Faire Mon Devoir," 6,116*l.* 9s. for drainage, and 5,842*l.* 7s. 6d. for water; "Sanitas" (No. 2), 12,542*l.* for drainage, and 11,200*l.* for water. The above estimates show a wide difference, certainly, and it is to be hoped that the successful competitor, whoever he may be, will have reason to rejoice in the accuracy of his estimate, in view of his personal salvation.

Mr. Andrews was asked to examine the estimates, with a view to advising the Board how best they could proceed. The Board, however, did not adjourn until it became the scene of a conflict.

One member proposed, while another seconded, a resolution dismissing Dr. Carruthers, for allowing a man suffering from small-pox to be brought ashore on the island. The resolution was carried on Monday, but at the request of five members another meeting was acceded to, for Wednesday, to reconsider the dismissal. At this last meeting a most violent passage at arms took place, the result being that the former resolution was rescinded. Having in the meantime appointed Dr. McLean, Portland Island Local Board is now blessed with the collective wisdom of two medical officers. The result may prove satisfactory if the two gentlemen will agree to work in harmony in the interest of the public health, however they may be personally disposed to differ otherwise.

PEDESTAL FOR AN EQUESTRIAN STATUE IN THE CITY.

Sir,—Praise ought to be meted where it is due, and this ought to be bestowed when one reads of 2,000*l.* being voted for a suitable pedestal for an equestrian statue, and a move in the right direction, when it is taken into consideration how much we lack such an appendage either to an equestrian or standing statue. Here there appears to be a fair opportunity for the architect and sculptor to act in unison in producing a work of art which may at length be creditable to the country as a work of taste and talent. W.

WHO IS HE?

Sir,—Pray who is "Mr. Buckmaster?" Pardon the abruptness of the question, but we people in the provinces are anxious to know. Some little time previously to the opening of the "International," we saw daily paragraphs in the morning papers notifying that "Mr. Buckmaster" had lectured at this and that place upon the advantages and objects of the coming Exhibition; indeed, so rapid were his transitions from one place to another on this high mission, that he appeared almost to be omnipresent. Since that time we have discovered that he possesses another attribute of deity,—that of omniscience; for during the Exhibition it appears that this same mysterious personage has periodically lectured upon nearly every subject under the sun, or, at least, under the roofs of the International Exhibition; art, science, manufactures, seem all to come alike to him. The newspapers tell us nothing; they name "Mr. Buckmaster" in the most matter-of-fact way, as if there were nothing astonishing in it: yet surely, sir, if this gentleman understands half the subjects he has been lecturing about, he must be one of the most remarkable men in England, and one whom we ought to know more about, if only to do him honour due. And again I ask, who is he? A Puzzled Rustic.

TILE MANUFACTURERS.

Sir,—We notice in the *Builder* of September 30th, a letter from Messrs. Minton, Hollins, & Co. relative to some slight mistake in the designation of Mr. Robert Minton Taylor's firm.

We have no desire to enter into any controversy between the two houses, as we have not the slightest pecuniary interest in either. A dissolution of partnership took place in 1868, when Mr. Colin Minton Campbell took the china, earthenware, and enamelled tile trades, under the style of "Minton & Co.;" Mr. Michael Daintry Hollins, the encaustic and other tile trade, under the style of "Minton, Hollins, & Co.;" and Mr. Robert Minton Taylor commenced business in encaustic and other tiles on his own account.

We should not have troubled you with any correspondence, except to correct the clerical error which occurs in your remarks upon the letter, of quoting "Minton & Co." instead of "Minton, Hollins, & Co." We by no means wish it to be understood that "Minton & Co., the representatives of your old acquaintance, the late Herbert Minton," had written such a letter as the one to which you refer. We are not so fond of "taking proceedings," and fully recognise the justness of your remark,—"That the world is not so fully taken up with the doings of themselves and their competitors, as to remember precisely how the names stand." Minton & Co.
Stoke-upon-Trent, and Walbrook, London.

Sir,—Under the above heading, in your last week's issue, appears a letter alluding to my firm so pointedly that it may be well for me "honestly and fairly" to make the following remarks.

"Honestly and fairly," in conjunction with my partner, I started business under the style of "R. Minton Taylor & Co." ("R. Minton Taylor" always having been my signature); and, during my suit with Mr. Michael Hollins, I offered to carry on business in my own name,—"Robert Minton Taylor." This offer, I admit, was pooh-poohed by Mr. Hollins's counsel; but Vice-Chancellor Malins remarked, "He could not see what more was required"; and honestly and fairly I have carried on business under the style of "Robert Minton Taylor," as my letter published in your issue of the 23rd ult. will demonstrate.

Again, although your last week's correspondent is singularly silent on the point, I am a nephew (by consanguinity, not mere affinity) and godson of the late Mr. Herbert Minton; and though I have sedulously avoided what I may call a pompous flourish of this fact in my business announcements, I have endeavoured, by following in my late uncle's footsteps, "honestly and fairly" to make a good article, and with some little success, as the Exhibition of 1871 will show.

As for you, Mr. Editor, I feel very sorry for you after the awful threat you have received; but if you will "honestly and fairly" insert this letter in your valued publication, I promise not to write to you about the matter again. Robert Minton Taylor.
Fenton, near Stoke-upon-Trent.

THE TRADES MOVEMENT.

Newcastle-upon-Tyne.—The compromise suggested by Mr. Mundella, M.P., for settling the Newcastle engineers' strike, has been refused by the masters. They say that their object in terminating the strike would be to get back their best workmen, but that they would fail to do this if they accede to the terms which have been approved by the men. They offer once more the compromise already suggested by Sir W. Armstrong, and are ready to have the dispute referred for arbitration to a national congress of employers and workmen engineers.

Sheffield.—The joiners and carpenters of Sheffield have issued a circular to their employers to the effect that as they have failed to obtain a meeting with the masters' association on the matters which have been in dispute since May, 1869, they intend to press the demands upon each employer separately. They ask for the nine-hours system and a code of rules.

Alnwick.—The journeymen slaters of Alnwick have struck for an advance of wages, after giving their employers a week's notice to that effect. Heretofore they have been paid at the rate of 24*s.* per week, but they now demand 28*s.*, a rise of 4*s.* per week. So far the masters have declined to accede, as they say they are unable to comply with the request of the men.

Barnsley.—The strike of bricklayers and labourers still continues, and there are no signs of a settlement. The masters express their determination not to give way, and are taking steps to supply the places of the men on strike. They state that they will find new hands constant work, and will protect them from all molestation. The men, on the other hand, are taking steps to prevent new hands being employed, and have pickets at the station and on the road leading into the town. The strike is causing considerable inconvenience, as nearly the whole of the work is standing.

Glasgow.—The whole of the shipwrights on the Clyde who have been on strike for an advance of wages during the past six weeks have been formally locked out by the masters.

CHURCH-BUILDING NEWS.

Weston.—St. John's Church, Weston, has been re-opened, after enlargement, by the Bishop of Bath and Wells. An apsidal chancel, with five lancet lights in the apse, has been built, which is divided from the nave by a chancel arch, supported by two pillars with carved capitals, the gift of the architect, Mr. Davis. At the south side a transept, capable of accommodating seventy persons, has been erected. This is separated from the body of the church by two arches, springing from a central shaft, and the bordering of the arches, as is also the case with the chancel arch, is coloured alternately with white and light grey. The end of the transept is pierced with a rose-window, below which is an ornamental doorway, and the roof of this and the other new portion of the building is, in accordance with the now prevalent custom in church-building, covered with red tiles, which of course contrast with the slates of which the remainder of the roof is formed. An organ-chamber has been built on the north of the chancel. There is a small vestry at the east side of the transept and at the other end of the building, on the same side, a spacious porch will serve the purpose of the old entrance at the western end. The church has been newly seated throughout, and the seating arranged on a fresh plan. Instead of a large block of seats in the middle, there are two blocks with a passage up

the centre, and the shape of the seats is such as to give greater comfort. Another improvement has been effected in the lowering of the floor and the removal of the low-pitched plaster ceiling. An encaustic floor has been laid in the chancel by Maw, of London; but in this portion of the building the work is incomplete, and the walls below the string-course must remain in a rough state in consequence of a want of funds. The amount of the contract for the enlargement of the church, however, has been raised, but this has only covered the cost of the new seating and the structural work, so that a debt of 350*l.* has been incurred in fittings and other contingencies.

Carnforth.—The first church in the town of Carnforth, near Lancaster, was commenced a short time since. The church will be in style fourteenth-century Gothic, and will consist of nave, 58 ft. by 25 ft.; chancel, 26 ft. by 19 ft., with south aisle and transept, vestry, and organ chamber. Provision is made for a future north aisle and transept. A tower and spire of the height of 110 ft. will be added when funds permit. The church will seat about 340 adults (sittings free). It is to be built of grey grit stone, and white free stone dressings of the neighbourhood. The roofs will be open-timbered and boarded, stained and varnished, and the seats of pitch pine, with carved bench ends. A stone pulpit and font are gifts to the church. The cost, as at present contracted for, is about 1,600*l.*, exclusive of tower and spire. The architects are Messrs. Brade & Smales, of Kendal; Mr. R. Clarkson, Mr. Ed. Parkinson, and Mr. T. Walmsley, of Carnforth, are the respective contractors.

SCHOOL-BUILDING NEWS.

Carlisle.—The Roman Catholic new school in Union-street, in this city, has been opened. The new building, which has been in course of erection for some months, has been built by private subscription at a cost of between 800*l.* and 900*l.*, and will accommodate 380 children. It has a high-pitched roof, topped with a bell-spire, and a large porch in front. At the back there is a large class-room, with an independent porch and entrance. There are two large three-light Gothic windows, with circular lights above. The bell is of good tone, and cost about 20*l.* The building is decorated on the outside with wrought-iron crosses,—one on the front porch, one on the class-room porch, one on each of the two gables, and one on the bell-spire. The material used for the edifice has been brick throughout, and the roof is of slate. In the inside the walls are wainscoted up to the window-cills, and above that they will be left bare, without plaster or any other covering. At one end of the room a space is raised above the floor for the master, and at the other is a small gallery. The artificial lighting will be by four circles of gas-jets pendant from the roof, and one or two brackets on the walls. A space behind the school will be set apart for the schoolmaster's garden, and, as soon as the funds will allow, a house will be erected for him on another portion of the site. The large site has been presented to the trustees by the Duke of Devonshire, and it is said to be worth about 500*l.* This is the third school which has been built in Carlisle by the Roman Catholics within the last five years. Messrs. Cory & Ferguson were the architects, Mr. Thomas Mowbray the contractor, and Mr. Musgrave the builder.

FROM IRELAND.

Belfast.—While this city has increased vastly in every direction, its style of architecture has also improved in like proportions. Donegall-place, which a few years ago presented a uniform front of private houses, devoid of any pretensions to beauty or style, is now almost completely occupied by superior buildings. Among the more recent erections are the premises of Messrs. Young & Co., which are just completed and occupied. The front elevation,—a modification of the Venetian style of architecture,—is of cut-stone from the Dungannon quarries, with windows of plate-glass. The building is four stories high, finished with a cut-stone parapet, terminated by large carved urns. The shop-front presents a spacious recessed pair of mahogany folding-doors, with panels of plate-glass set in between a pair of columns of Newry granite, with carved capitals, the window on each side being of a plate of glass, containing 100 superficial feet, in one piece, set in mahogany frame. The front of the first and second wareroom floors is divided into five segmented arched windows, the arches springing from detached columns of polished pink granite, the front of the upper story being divided into seven windows, with semicircular arched heads springing from cut-stone columns and pilasters. The shop-floor is about 34 ft. wide by 80 ft. in depth. The designs for the building and fittings were furnished by Messrs. Thos. Jackson & Son; and the works carried on under their direction by Messrs. J. & J. Guiler. The painting and decorations have been executed by Mr. George Coulter.

MONUMENTAL.

The Derby Memorial at Preston.—The committee have decided that the best available site is in front of the Belvidere, in the Miller Park. Mr. Noble, the sculptor, has fallen in with the views of the committee that the statue should be of bronze rather than of marble, and it will be 10 ft. high at least, instead of 8 ft. 6 in., as originally agreed upon.

Monument to Cardinal Wiseman.—A monument in white marble has been placed over the grave of Cardinal Wiseman in the Roman Catholic Cemetery at Kensal-green. It is covered by a frame of wood and glass, and will, it is said, be placed hereafter in the new Roman Catholic Cathedral of the diocese. The work has been executed by Messrs. Farmer & Brindley, of Westminster-road, from designs by Mr. Pugin. Above the tomb is a recumbent figure of the Cardinal in ecclesiastical vestments, and on the sides are sculptured several scenes in his life.

The Brunel Statue.—The Brunel statue has been temporarily erected on the Victoria Embankment. The decision of the Metropolitan Board of Works with regard to the pedestal and the general mode of its erection, has been requested by Mr. St. George Burke. The subject has been referred to the Works Committee.

Books Received.

The new number of *Fraser* contains an article "As to the Decoration of St. Paul's Cathedral," by An Architect. Concerning the Iconographic Scheme which has been obtained by the Committee, the writer says,—

"We must be permitted to point out that the committee, in addressing themselves to the general public for aid, are inviting subscriptions for what a large number of those invited will consider a serious anachronism. The scheme of decoration is to include, it seems, a whole cycle of Biblical and ecclesiastical miracles; not to speak of the Six Days' Creation, the nine Orders of Angels, Cherubim 'full of eyes,' mediæval Saints with their appropriate symbols, and such other standard pieces of ecclesiastical furniture. If the committee have any idea of what is going on in the world, they ought to be aware that the majority of thinking persons among us regard these things as historically false and totally irrelevant to religion, and even to Christianity in its highest aspect. If they look on the Cathedral as the property of Churchmen to do as they please with, that is an intelligible position; but to advertise such a decorative programme as a work recommending itself to no one class or creed' is simply ridiculous. They cannot reasonably expect support for such a scheme from any one outside the pale of their own communion, nor from many within it. If the Committee wish the decoration of St. Paul's to be taken up as a national work, let them leave illustrating what many regard as mere fables, and turn to the broader and sublimer moral attributes of Christianity, the illustration of which, in various phases and through various actions, might furnish subjects of the highest order to thoughtful and original artists. We have little hope, we admit, that this hint will be acted upon; the ecclesiastical amateurs, we fear, are too stiff in their own views, the ecclesiastical artists too nearly in the position of the silversmiths of Ephesus, to listen to reason on this topic. But if ever the scheme is carried out which is to convert our only Renaissance Cathedral into a great storehouse of ecclesiastical 'properties,' we shall be able to say that in one quarter at least a protest was raised against the proposition to embody, in an imperishable material, histories and theories, the actual truth and moral relevancy of which are at this very time becoming every day more and more widely questioned."

Miscellanea.

The St. Gothard Railway, with a tunnel about the length of that of the Mont Cenis, will, it appears, very soon be commenced. The capital necessary for the tunnel is about 60,000,000 francs, and for the lines to join the Italian and Swiss Railway about 125,000,000 francs. Subsidies to the extent of 85,000,000 francs have been voted by Germany, Italy, and Switzerland, and the remaining 100,000,000 francs will be taken by a syndicate,—65,000,000 francs in bonds, bearing 5 per cent. interest, and 35,000,000 francs in shares. It is estimated that at least seven to eight years will be required for the entire completion of the work.

Harvest Home Church Decorations.—The memorial church of Welshampton, on the harvest-home thanksgiving occasion, when the Rev. Congreve Selwyn and other clergymen conducted the services, was tastefully decorated by Mrs. Selwyn and a number of other ladies. On entering the church, the first thing that arrested the eye was the marble font, with a green moss Maltese cross for the groundwork, upon which was a circle of purple aster blooms, through and under which passed the long Roman cross, in white aster blooms, forming the apex of a fine dome of flowers in the font proper. The first window, on the north side of the church, was decorated with a miniature sheaf of corn, on the inside cill, upon a groundwork of moss, interspersed with dahlia blooms, ferns, geraniums, and calceolarias. The second and third windows bore sheaves of corn, with the accompanying flowers and moss, and between the two latter was a blue silk banner, with a white cross in the centre, studded with purple and gold ornaments. The marble pulpit was decorated at the base and centre with fuchsias, asters, moss, ferns, and other choice flowers. On either side of the supporting pillars of the chancel arch was a banner, with gold letters on scarlet ground, the one on the left being "I am the true Vine," and that on the right hand "I am the Bread of Life," with a sheaf of wheat in the centre of the latter, and a bunch of grapes in the former. But the choicest of the decorations culminated in the chancel, and on, around, and above the altar, the floral decorations being profuse.

Westgate-on-Sea. — This new watering-place, destined, apparently, to be the St. Leonard's of Margate, and to which we first drew public attention, is making very satisfactory progress. *Keble's Gazette* (Margate) says,—"There are evident signs that Westgate-on-Sea is destined to become, in a very few years, a watering-place of no inconsiderable size. We see around indications that the estate is managed by a master mind. Thousands of pounds have already been spent in providing a perfect system of drainage and on its magnificent roads. On the sea-wall which skirts the whole of the charming bay a beautiful promenade is constructed for the enjoyment of the visitors. Terraces of houses have already been erected; and we understand such has been the success of Beach House (private hotel) during this season, that an hotel, vieing with some of the largest in the kingdom, will shortly be erected." The site is the promontory between the two bays, and a beautiful situation it is. The London, Chatham, and Dover Railway has opened a station here, and the arrangements are such as to recommend them to the notice of those whose avocations may require their presence in the great metropolis every day. The sea view is unsurpassed, and the level sands admirable for sea bathing. The population is increasing, and the spiritual wants of the locality have not been forgotten. Already, thanks to the energy and consideration of the vicar of St. John's, it has been determined to build one of the churches for which endowment has been given by the Ecclesiastical Commissioners, with a parsonage-house, on the site opposite Dent-de-lion Gates, about five minutes' walk from Westgate-on-Sea.

The Flux-Motor.—A "Description of an Improvement made by Ferdinando Tommasi, on his Invention, the Flux-Motor," has been printed at Boulogne-sur-Mer, by Camille le Roy, 51, Grande-rue. In this pamphlet the inventor says he has "found a means of giving to the engines of the Flux-Motors a tension double that which would have been communicated to them by the height of the column of sea-water available. . . . . When the tide rises, a part of the compressed air is changed into rarefied air; and when the tide falls, a part of the rarefied air becomes changed into compressed air, and this produces on the working piston a pressure double that which it would have experienced by the simple effect of the weight of a column of sea-water whose height would be equal to half the total height of the tide employed. Hence follows the conviction that by means of the present improvement the piston will always be in a position to work as well when the tide is rising as when it is falling, under a pressure equal to the weight represented by a column of sea-water whose height is the same as the total height of the above-mentioned tide. And as tides of 10 mètres high (above 30 ft.), which, with the present improvement, represent the tension of one net atmosphere, exist on almost all shores Flux-Motors can be utilised almost everywhere."

Exeter Cathedral.—At a recent meeting of the Exeter Diocesan Architectural Society held at Exeter, the Earl of Devon presiding, the Rev. J. L. Fulford (hon. secretary) read the report of the committee, which referred chiefly to the work of re-arranging and re-fitting the choir of the cathedral. Since the last meeting, considerable progress had been made in the work of restoration. The modern altar-screen, the modern pavements, and the very late and meagre stall-work had been removed. The removal of the altar-screen had very much improved the interior effect of the building. The removal of the modern pavement had led to the discovery of the old altar foot-pace and steps, and an old tile pavement; and behind the stall-work, on the north and south sides, a modern brick wall, pointed, was found, with a continuous oak bond set therein, evidently for the purpose of attaching to the wall the back of the stall-work just removed. The removal of the return stalls brought to light a very rough unfinished wall on the eastern face of the solid wood screen. The shafts of the western pier north and south of the choir were of Purbeck marble, and were finished like the other piers in the arcade, and they had their bases quite as carefully wrought and moulded. But a wall of rough masonry was worked without care against and around these Purbeck shafts and bases. After some discussion as to the propriety of removing the old high screen, to which Mr. Scott, the architect, had objected, and which the dean and chapter had decided not to do, the report was adopted.

Proposed New North and South Railway in Yorkshire.—An influential meeting of merchants, manufacturers, and others interested in promoting the proposed railway connecting the South Yorkshire coal-fields with Halifax, Huddersfield, and Keighley, and affording a more direct means of communication between those towns and the North and South, has been held in the White Swan Hotel, Halifax. The mayor presided. Mr. Hamilton Fulton, engineer, explained the route of the proposed railway, and pointed out the advantages it would confer upon the town of Halifax and other places on the proposed line. The meeting was enthusiastic and unanimous in favour of endeavouring to secure for the town improved railway facilities, and of having a line independent of the two great companies now proposing amalgamation. Finally, it was unanimously resolved that the requirements of the town of Halifax absolutely needed improved railway communication north and south, and station accommodation in the higher parts of the town; and the meeting appointed a committee to examine the scheme proposed, and report to a future meeting. The committee includes the mayor, and Mr. E. Crossley, Colonel Akroyd, M.P., and other influential gentlemen.

Extensive Sewage Operations.—The most extensive scheme for the irrigation of towns' sewage yet promulgated and in actual progress of development is, perhaps, that which is now being carried into practice by the corporation of Blackburn. During last session this corporation obtained powers to effect large purchases of lands, or to acquire them on lease; and powers were also secured to borrow between 20,000*l.* and 30,000*l.* to carry out irrigation works, with liberty to spread the repayment of loans employed in purchasing lands, over a long term of years. By the Act of last session the corporation have power to acquire 1,000 acres of land for irrigation purposes. An agreement has been entered into between Sir Henry de Hoghton and the corporation with reference to the Higher and Lower Park farms, which consist of about 180 acres, and possession has been taken by the corporation. Upon these farms it is proposed to utilise part of the sewage, which will be distributed by means of valves and troughs. The land, for the most part, has a wild, moor-like aspect, but the soil, being of a sandy nature, is well suited for receiving a large quantity of sewage.

Slate Ridges for Roofs.—According to the invention of Mr. John Thomas, of Bangor, the slate ridge is constructed in three divisions, consisting of a top roll and two wings, which, when united, form a solid ridge; the wings terminate in flanges, which are placed together within a square slot cut along the under surface of the roll, and are first secured by lateral screws or rivets, and finally by lead, putty, or other suitable adhesive packing, the wings being secured to the ridge-board by vertical screws prior to the application of the top roll.

The Duke of Edinburgh's Residence in Coburg.—Shortly after the death of Prince Albert, the Duke of Edinburgh inherited a large mansion and grounds in Coburg. At that time the mansion-house was in disrepair, and it was allowed to remain in this condition until about two years ago, when workmen from the town of Gotha and neighbourhood were engaged by the duke to put the place into a state of complete repair. The work went slowly on in consequence of the outbreak and continuance of the war between France and Germany. At the close of the war the operations were resumed and carried on with vigour, and it is believed the duke will reside in the mansion-house when he visits Germany. In connexion with the alterations and improvements, the *Dundee Advertiser* says that the paperhanging and many of the other decorations—which are on an extensive and costly scale—have been executed by workmen sent from London by Mr. J. M'Lachlan, St. James's-street, decorator to her Majesty the Queen.

New Railway Station at York.—An extensive station is about being built at York by the North-Eastern Company. In length the station will be a quarter of mile, or 1,320 ft., and in form it will be a crescent. The approaches will have direct reference not only to the convenience of the company, but also to that of the public. The works will be carried out as speedily as possible. Already the company are proceeding with the erection of a new carriage-shed, capable of holding 300 carriages at one time, and fully one-third of a mile in length. It is in contemplation to build a large hotel in connexion with the new station. In front of the hotel, and facing the museum on the other side of the Ouse, will be a series of terrace gardens extending down to the river. The cost of these works will not be much less than a quarter of a million. The Railway Plant Company (Limited), and Messrs. Close, Ayre, & Nicholson, ironfounders, have obtained fourteen acres of ground whereupon to erect works, at which about 1,000 men will be employed.

Discovery in Copford Church.—The church of Copford is a specimen of Norman work, with the east end of a semicircular form. Workmen, while engaged in some much-needed repairs to the east end, and in preparing for a memorial stained window which is to be placed there, discovered beneath the whitewash evidences of colouring. Under the guidance of the architects (Messrs. Slater & Carpenter, of London) and Mr. Joseph Grimes, the whitewash has been removed, showing that the whole of the east end of the church was formerly painted. An artist has examined the paintings, and it is understood that an attempt will be made to restore them. In Wright's "History of Essex" we find the following:—"In 1690, as the workmen were preparing the walls for whitewashing, it was discovered that very good paintings of the Crucifixion, of Peter's mother-in-law lying sick of a fever, of Mary Magdalen, and other subjects, had been covered over with whiting."

Bending Metal Tubes.—In a machine invented by Mr. Charles Höller, of Cincinnati, U.S., the sheet metal pipe or tube is passed by a step-by-step motion over a mandril, at the end of which are two sets of clamps or jaws surrounding the pipe, and so operating in combination with a rocking disc or head situated inside the pipe beyond the end of the mandril, that as the pipe passes over the end of the mandril the one set of clamps or jaws is caused to close down upon the pipe, nipping it upon the end of the mandril, while the other set of clamps closes down and nips the pipe upon the rocking head, which on then being forcibly brought together with the last-named clamps and the portion of the pipe nipped thereby, close up to the end face of the mandril and the first-named clamps, bends up or crimps a portion of the circumference of the pipe situated between the two sets of clamps, and thus by a succession of such crimpings or bendings at short distances apart, the elbow or bend is formed on the pipe.

Proposed New Road from Eaton-square to Brompton-road.—A communication was read at the last meeting of the Metropolitan Board from Messrs. Edwards & Co., requesting on behalf of the Belgravia-road Company that the Board will re-consider the application of the company for a contribution towards the cost of the formation of a new road from Eaton-square to the Brompton-road. The subject was referred to the Works Committee.

Embankment of the Coast.—It is very desirable that Government should without delay proceed to protect the exposed portions of the coast line, commencing a sea-wall at Sheerness, round the Isle of Sheppey, and continuing the embankment or sea-wall to Ramsgate, underpinning or underpinning the chalk cliffs with an inclined brick facing to high-water mark. In many portions grooved cast-iron piles and facing plates backed by a wall of concrete would be found serviceable. Ample provision should be made for the inland drainage, almost as destructive in crumbling away the cliffs in winter as the ocean. The reclaimed land, as the whole coast of England would require more or less this mode of treatment, would be in itself no unimportant feature.—L. S.

Labour and Capital.—In the struggle of labour and capital it strikes a looker-on that the labourer is running his best friend, his only friend—capital—rather hard. The labour of the working man but represents the body,—physical power,—while capital represents the intellect,—mental power. Capital represents accumulations of science in applying them. Labour only represents skilful detail under the direction of science. Which is the higher?—the directing head or the directed hand?—the general who commands or the private soldier who is clever with his Martini? Who wins the battle, the leader who combines or the follower who fires off his rifle? The best friend of labour is capital. It was but a foolish man who killed the goose which laid the golden eggs.—Alpha.

Presentation to the Borough Surveyor of Reading.—Mr. A. W. Parry, who has been for eight years in the service of the Bradford corporation, and has filled the post of deputy to the borough surveyor, has been presented with a gold watch and chain, and a written testimonial, presented by upwards of 100 subscribers, officers, and workmen of the corporation, on his promotion to the office of Borough Surveyor of Reading. The presentation took place in the committee-room at the Corporation offices. The town clerk, who presided, said he had been requested by the officers and workmen of the corporation to express the regret they felt at parting with him, and the respect and esteem in which he was held.

Dwellings for the Industrial Classes.—Mr. Benjamin Colls, a member of the Court of Common Council, has given notice of his intention to move that the Improvement Committee of the corporation be instructed forthwith to adopt measures for carrying out the provisions of the Holborn Valley Improvement Acts, 1864 and 1867, with respect to labourers' dwellings, as directed by clauses of the said Acts; and further, that a petition be presented to the Court of Chancery for permission to defray the cost of such buildings out of money now in that court belonging to the corporation.

Further Experiments with Asphalte Paving in the City.—An opportunity will shortly be afforded to the public of testing the relative merits of the different kinds of asphalte paving. At the instance of the Commissioners of Sewers, Moorgate-street has just been paved with three kinds of asphalte, the Val de Travers, the Limmer, and Barnett's, for the purpose of ascertaining by public experience which is the best and most durable. The City Sewers Commission have just authorised the further extension of asphalte paving, at a cost of more than 6,000*l.*, at Cornhill, Threadneedle-street, &c.

The Commons Preservation Movement.—An interim injunction has been obtained by the City authorities to restrain parties from ploughing on certain land at Epping Forest until the whole question has been argued, and the City Commissioners of Sewers heard upon it. The solicitor to the Metropolitan Board reports that the matter of Hampstead-heath should, according to the Act, be now completed; but although he had day by day been in communication with the parties, they were not yet quite ready. It is important that there should be no delay.

Royal National Opera, St. James's Theatre.—We heartily wish well to the endeavour which is being made here to establish English opera, and shall find an opportunity to say something on the subject. *The Rose of Castile* and the *Bohemian Girl* have been very fairly presented, but efforts will be needed to achieve success. Miss Rose Hersee sang and acted with great success in both.

Great Explosion in Chelsea.—A destructive explosion of gas, followed by other explosions and fire, took place in the premises of an oil and colourman, 8, Manor-street, King's-road, Chelsea, on Wednesday. Whilst seeking, rashly as usual, for gas leakage with a light, the escaped gas exploded, and set on fire some of the paraffine and colza oil, turpentine, varnish, &c., stored in the cellar. A quantity of gunpowder exploded, blowing up the floors, sending beams, slates, oil cisterns, &c., high in the air, and doing considerable damage to windows. This explosion was followed by a second, which seems to have been caused by another barrel of powder taking fire, and also saltpetre, sulphur, and pitch. Sixteen persons were seriously injured.

The Letter Postage.—The reduction in the postage of letters has come into operation. The half-ounce weight disappears from the postal scales, and the halfpenny stamp comes into use, for letters above an ounce weight. The lowest letter postage will still be a penny; but the penny stamp will cover all letters not exceeding an ounce; while only an additional halfpenny stamp will be required for every additional half-ounce in weight. The other uses of the half-penny stamp do not seem to be affected.

The Tammany Frauds at New York.—A New York correspondent of the *Morning Post* says:—"Last year one of the oldest and best-known merchants in the 'swamp,' wished to have the street in which he lived repaired. The pavement was simply disgraceful. All the houses being freehold, their owners joined in a petition to the municipality to allow them to have it done at their own expense. This was denied them, unless they used a patent which was under contract to pay 20 per cent. out of the profits to the Court of Aldermen. The freeholders declined, and the street remains as before."

The Liverpool Borough Engineer and Borough Surveyor.—The committee interested in the selection of candidates for these important offices have met and selected six gentlemen for the office of borough surveyor, and a similar number for that of borough surveyor. For the office of borough engineer the choice will only be difficult from the extreme excellence of the candidates; but the office of borough surveyor is supposed to require great *local* knowledge, and if scarcely any *local* surveyors apply for the appointment, the committee will be awkwardly placed.

A District Post-office for Woolwich.—Plans have been prepared and a site selected for the erection of a district post-office for Woolwich, within the Royal Arsenal, but having no communication with that establishment, and open only upon the public road. It is intended to be three stories high, and to accommodate about sixty sorters and clerks, as it is intended to make the office the centre for all the postal and telegraphic business of the surrounding locality as far as Sydenham, the letters and messages within which district have at present all to go through the City.

New Alloy of Copper and Iron.—Dr. Meyer, of California, is said to have invented a new alloy, composed of copper and iron, united in certain proportions, to form a substance which can be tempered to a hardness greater than that of steel, and can be easily worked. It is claimed that it can be used with great advantage for such articles as shoes and dies of stamp-mills, for instance; and, on account of its great hardness, will outlast, by a very considerable length of time, those now made of chilled cast-iron, while they can be manufactured just as cheaply.

A Public Park for Leeds.—The Roundhay Park estate, which is situated two miles from Leeds, has just been sold by auction, and purchased by the corporation of the borough for a public park. Altogether, the estate covers 1,400 acres, the mansion, park, and lakes comprising 600 acres, and the price paid was 107,000*l*. Another lot, which will bring the entrance to the park half a mile nearer the town, was also bought by the corporation for 32,000*l*.

The Dublin Exhibition Building as a Museum.—Sir Arthur Guinness, the principal if not the sole proprietor of the Dublin Exhibition Palace, has resolved to convert it into a public "Museum of Art, Industry, and Manufactures," as closely as possible in imitation of the South Kensington Museum.

An Incendiary at Half-a-crown a Fire. A blacksmith has been brought up at the Thames police-court, charged with wilfully setting fire to some goods on St. George's Sufferance-wharf, Wapping-wall. Within a few months he has announced thirty-six fires at different stations of the brigade, and it is conjectured that he has partly obtained his living by incendiarism, as the authorities allow a gratuity of 2s. 6d., or 1s. to the person who brings the intelligence of a fire to the nearest station. About 100,000*l*. worth of property has been destroyed in these fires!

A Working Men's Hospital.—The Baroness Burdett-Coutts has been invited to lay the foundation-stone of the working men's extension wing of the Queen's Hospital, at Birmingham. It is expected that she will be present, and that the ceremony will take place about the end of this month. A sum of 5,000*l*. has been raised in three years by the periodical contributions of 20,000 workmen in the principal factories of the town. It will be the first hospital in the kingdom erected by the contributions of working men.

Survey and Main Drainage of Heckmondwike.—At a meeting of the Heckmondwike Local Board, held on Monday, the 25th of September, Mr. M. Paterson, C.E., Dewsbury, was unanimously appointed to carry out a complete survey of the district, 10 ft. to the inch, and to design a system of main drainage. Heckmondwike (West Riding), although a manufacturing town of 9,000 or 10,000 inhabitants, and steadily increasing in importance, has been hitherto without any connected system of sewerage.

Proposed Fountain in Hamilton-place and Park-lane.—At the last week's meeting of the Metropolitan Board of Works a letter was read from Mr. Ayrton, as Chief Commissioner of Works, transmitting a drawing of the fountain which Mrs. Brown is desirous of erecting at the junction of Hamilton-place and Park-lane, and trusting it will meet with the Board's approval. The letter was referred to the Works Committee.

Patent Window Blinds.—Mr. J. Kent, the inventor of these blinds (patent dated 7th of March, 1871), attaches a small bracket to the window-frame, carrying a pawl or catch hung loosely therein. A movable sliding rack passes through the bracket, and is held in any position by the pawl. The blind cord is passed round a pulley at the end of the rack. This rack-holder may be used for tightening machine bands and for other purposes.

The Great Exhibition at Vienna.—The erection of the building for the International Exhibition at Vienna has already commenced, and the works are being pushed rapidly forward, in order to get as much done as possible before the winter sets in. It is expected that the whole building will be completed by October, 1872, so as to be ready for the consignments from distant countries which are to arrive about that time for the Exhibition.

National Portrait Gallery.—The collection has been re-arranged by Mr. Scharf with evident advantage. A portrait of Benjamin Franklin is amongst the recent acquisitions. It may be useful to mention that the gallery (at South Kensington) is open to the public on Mondays, Tuesdays, and Saturdays, from ten to six o'clock in summer, and from ten to four in winter. Admission free.

Society of Engineers.—On Monday evening the first meeting of the present session was held at the Westminster Palace Hotel, when Mr. Perry F. Nursey read a paper "On the Recent Improvements in Explosive Compounds." The discussion was long and ample, much interest being manifested in the subject.

Bursting of a Sewer in Hackney.—On Monday night a sewer burst in Mare-street, Hackney, and several cellars were inundated. It is stated that many suffered in health from the sickening odours which were thus spread through their dwellings. It is to be hoped that the cause of this accident will be thoroughly inquired into.

Fine Arts in University College.—The inaugural lecture of the newly-established department of the Fine Arts at the University College has been delivered before a crowded audience, by Mr. E. J. Poynter, A.R.A., the Slade Professor.

The New Cattle Market at Woolwich. Upwards of 500 workmen are engaged in converting her Majesty's Dockyard at Deptford into a new cattle-market for the city of London, according to plans approved by the corporation. Extensive ranges of buildings are being rapidly demolished, and others are being converted into receptacles for cattle.

TENDERS

For premises, Quarry-street, Woolton, near Liverpool. Quantities supplied:—

Johnson*	£1,083 0 0
Walker & Co.	1,063 10 0
Crowther & Houghton	1,062 0 0
Oliver	1,060 5 6
Peters & Ball (accepted)	1,059 0 0

* All the contractors belong to the neighbourhood with this exception.

For lodge, stables, conservatory, &c., Caterham, Surrey. Mr. R. Martin, architect. Quantities supplied by Mr. F. Sparrow:—

	Lodge.	Stables, &c.	Conservatory, &c.
Smethurst	£382	£430	£419 0 0
Legg	307	379	385 10 0
Bridgman, Nuthall, & Co.	301	375	371 0 0
Ward	275	339	363 0 0

For the Whole.

Jarrett	£1,130 0 0

For the foundations to New Crane Wharf, Shadwell, for Mr. W. Rose. Mr. C. F. Dunch, architect:—

Browne & Robinson	£9,420 0 0
Ennor	9,370 0 0
Aird & Son	8,970 0 0
Henshaw & Co.	7,437 0 0
Hill, Keddell, & Waldram*	7,278 0 0
Brass	6,493 0 0

* Accepted.

For the erection of a new warehouse, St. Bride's Wharf, Wapping, for Messrs. Middleton, Son, & Co. Mr. C. F. Dunch, architect:—

Ashenden	£8,635 0 0
Pearson	7,917 0 0
Macey	7,760 0 0
Ennor	7,573 0 0
Browne & Robinson	7,360 0 0
Kirby	7,272 0 0
Henshaw	7,239 0 0
Hill, Keddell, & Waldram*	7,093 0 0

* Accepted.

For erection of cottage residence for Mr. G. U. Riddlestorffer, at Burgess-hill, Sussex. Messrs. Goulty & Gibbins, architects:—

Hollands (accepted)	£660 0 0

For alterations to Apley, the marine residence of Mr. N. Clayton. Mr. T. Dashwood, architect:—

Langdon	£5,000 0 0
Sibley	4,295 0 0
Colenutt	3,892 0 0
Barton (accepted)	3,760 0 0

For additions to 147, Holborn, for Mr. Louis P. Casella. Mr. J. Schofield, architect:—

	A.	B.
Tilley	£625	£157 0 0
Simpson	610	157 0 0
King & Son	599	161 0 0
Baugh	554	165 10 0
Patman & Fotheringham	522	156 0 0

For the Whole.

Longmire & Burge	£607

For additions to house and premises, No. 24, Finsbury-place, for Messrs. Dashwood, Brothers. Mr. R. Walker, architect:—

Heeps	£1,389 0 0
Pettigrew & Moys	1,197 0 0
King & Son	1,195 0 0
Merritt & Ashby	1,150 0 0
Sewell & Son	1,082 0 0
Perry, Brothers	1,081 0 0
Kirby	1,035 0 0

For a factory, City-road, London. Mr. H. Ford, architect:—

Meyers & Son	£4,592 0 0
Gammon & Son	4,398 0 0
Nightingale	4,307 0 0
Simpson	4,300 0 0
Morter	4,260 0 0
Conder	4,207 0 0
Browne & Robinson	4,283 0 0
Williams & Son	4,250 0 0
Sabey & Son	4,250 0 0
Brass	4,195 0 0
Perry & Co.	4,185 0 0
Blease	4,173 0 0
Scrivner & White	4,125 0 0
Henshaw	4,125 0 0
Perry, Brothers	4,077 0 0
Kirby	3,984 0 0

For rebuilding stores, show-rooms, &c., for Mr. Sanby, at the back of the Walls, Southampton. Mr. W. Cole, architect. No quantities:—

Martin & Sons	£368 0 0
Stevens	362 0 0
Gambling	365 0 0
Crook	369 0 0

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M. F. — E. — R. W. — J. R. E. — Mr. S. A. — D. W. S. — T. A. S. — J. W. — J. C. A. — W. & U. — D. A. — C. C. H. — A. R. W. — W. L. (question should be determined on the spot, with reference to other matters).—J. R. (below our mark).—J. S. H.—G. H.—J. W.—G. H.—G. P. K.—W. P.—J. W. N.—H. R. S.—J. K.—A. B.—A., Bradford.

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